SERVICE MANUAL

CONDENSING UNITS

ASE-76AH, ASE-96AH, ASE-120AH

sinclair
AIR CONDITIONING

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Part 1 General Information

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1. Model Names of Outdoor Units

1.1 Model Names of Outdoor Units:

Outdoor unit		Capacity	
Model	Power supply	kW	Btu/h
ASE-76AH	380~415V-3N-50Hz	22	76
ASE-96AH		28	96
ASE-120AH		35	120

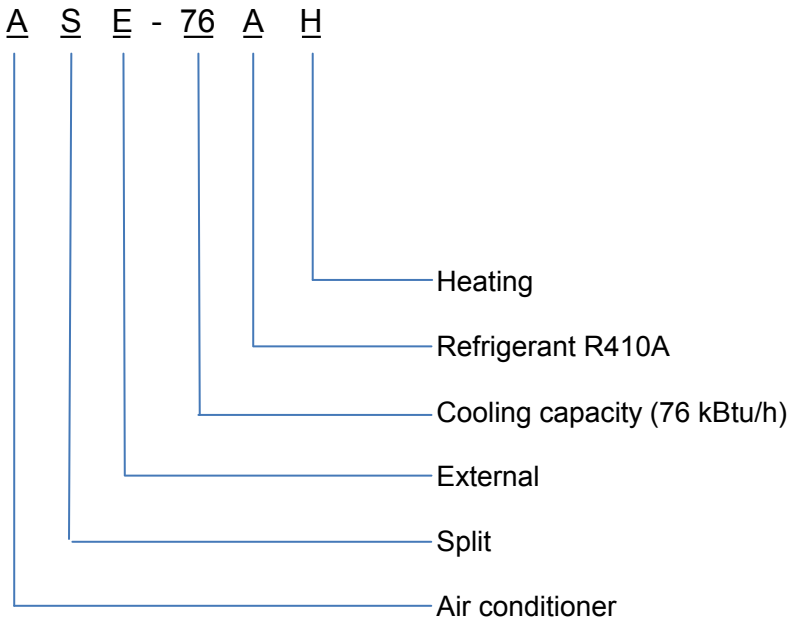
2. External Appearance

2.1 Outdoor Unit

ASE-76AH **ASE-96AH**	**ASE-120AH**

3. Nomenclature

3.1 Outdoor unit:



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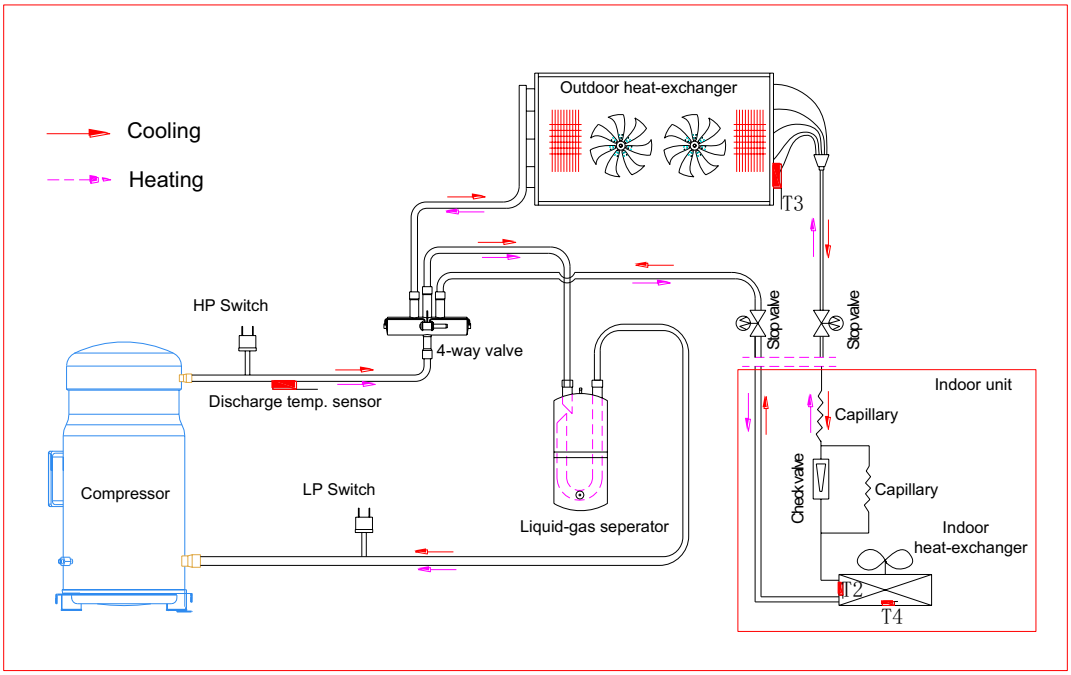
1. Specifications

Model			ASE-76AH	ASE-96AH
Power supply		-	380~415V-3N-50Hz	380~415V-3N-50Hz
Ambient temp range		?	-7～52	-7～52
Rated input		W	11700	14400
Rated current		A	19.3	23.7
Noise level		dB(A)	65	67
Compressor	Type	-	scroll	scroll
	Brand	-	Copland	Copland
	Model	-	ZP90KCE-TFD-522	ZP120KCE-TFD-522
	Qty.	-	1	1
	Capacity	Btu/h	74500	100000
	Input	W	6950	9110
	Rated current	A	12.3	16.6
	Locked rotor Amp	A	110	110
Refrigerant	Type	-	R410A	R410A
	Charge	g	5400	6000
Fan	Type	-	Axial fan	Axial fan
	Dimension	mm	Φ530	Φ530
	Drive type	-	Direct	Direct
	Motor input	W	310+292	670+644
	Motor speed	rpm	928/942	1250/1220
Coil	Type	-	Copper tube and aluminum fin	Copper tube and aluminum fin
	Tube size	mm	Φ7.94	Φ7
	No. of rows	-	2	3
	Fin per inch	FPI	18	19
	Length x height	mm	2185x880	2179x882
Refrigerant piping	Liquid side / Gas side	mm	Φ9.52/Φ22	Φ9.52/Φ25
	Max. pipe length	m	50	50
	Max. difference in level	m	30	30
Connection wiring	Power wiring	mm^2	5x6.0	5x6.0
	Signal wiring	mm^2	4x1.0	4x1.0
Dimension (WxHxD)		mm	1260x908x700	1260x908x700
Packing (WxHxD)		mm	1320x1060x730	1320x1060x730
Net / Gross weight		kg	174/193	187/204
Shipping Qty per 20'/40'/40'HD		pcs	24/54/54	24/54/54

Notes:
1. Nominal cooling capacities are based on the following conditions:
Indoor temp: 27°CDB, 19°CWB; Outdoor temp: 35°CDB; Equivalent refrigerant piping: 7.5m (horizontal)
2. Nominal heating capacities are based on the following conditions:
Indoor temp: 20°CDB; Outdoor temp: 7°CDB, 6°CWB; Equivalent ref. piping: 7.5m (horizontal)

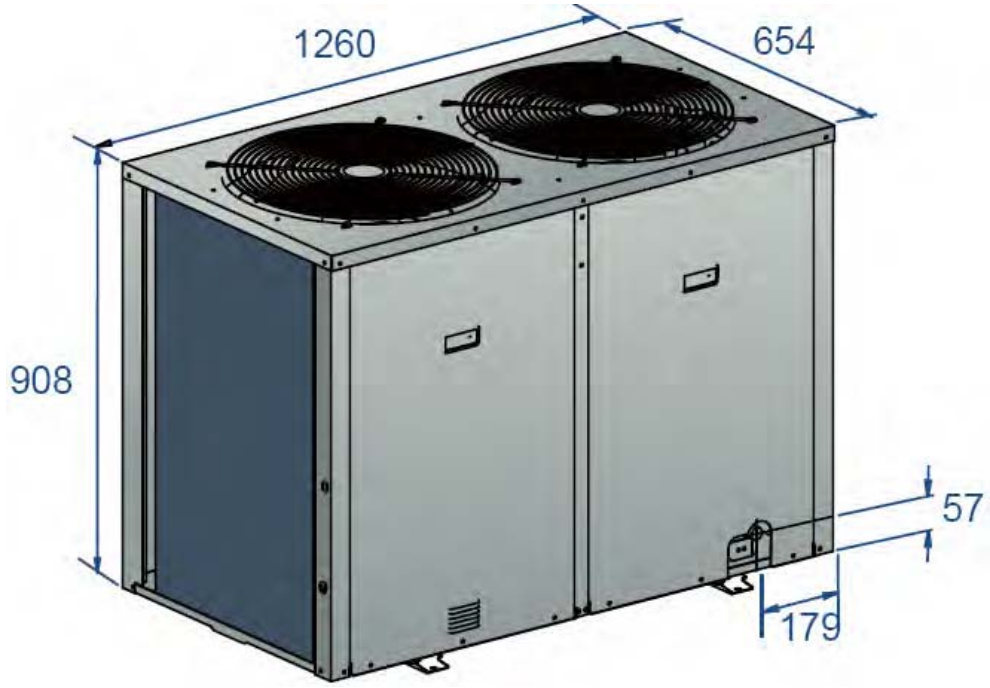
Model			ASE-120AH
Power supply		-	380~400V-3N-50Hz
Ambient temp range		?	-7～52
Rated input		W	17300
Rated current		A	28.6
Noise level		dB(A)	69
Compressor	Type	-	scroll
	Brand	-	Danfoss
	Model	-	SH140A4ALC
	Qty.	-	1
	Capacity	Btu/h	118000
	Input	W	10862
	Rated current	A	21.4
	Locked rotor Amp	A	147
Refrigerant	Type	-	R410A
	Charge	g	7200
Fan	Type	-	Axial fan
	Dimension	mm	Φ531
	Drive type	-	Direct
	Motor input	W	621+587
	Motor speed	rpm	1230/1180
Coil	Type	-	Copper tube and aluminum fin
	Tube size	mm	Φ7
	No. of rows		3
	Fin per inch	FPI	19
	Length x height	mm	1376x880
Refrigerant piping	Liquid side / Gas side	mm	Φ12.7 / Φ28.6
	Max. pipe length	m	50
	Max. difference in level	m	30
Connection wiring	Power wiring	mm^2	5x6.0
	Signal wiring	mm^2	4x1.0
Dimension (WxHxD)		mm	1260x908x700
Packing (WxHxD)		mm	1320x1060x730
Net / Gross weight		kg	201/217
Shipping Qty per 20'/40'/40'HD		pcs	24/54/54

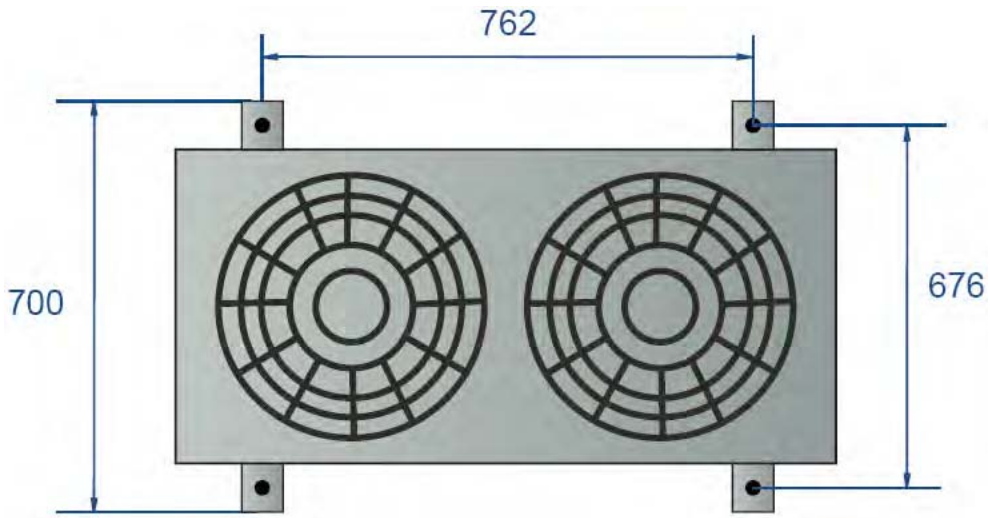
Notes:
1. Nominal cooling capacities are based on the following conditions:
Indoor temp: 27°CDB, 19°CWB; Outdoor temp: 35°CDB; Equivalent refrigerant piping: 7.5m (horizontal)
2. Nominal heating capacities are based on the following conditions:
Indoor temp: 20°CDB; Outdoor temp: 7°CDB, 6°CWB; Equivalent ref. piping: 7.5m (horizontal)


Cooling
Heating
Outdoor heat-exchanger
T3
HP Switch
4-way valve
Stop valve
Stop valve
Discharge temp. sensor
Indoor unit
Capillary
Check valve
Capillary
Compressor
LP Switch
Liquid-gas seperator
Indoor
heat-exchanger
T2
T4

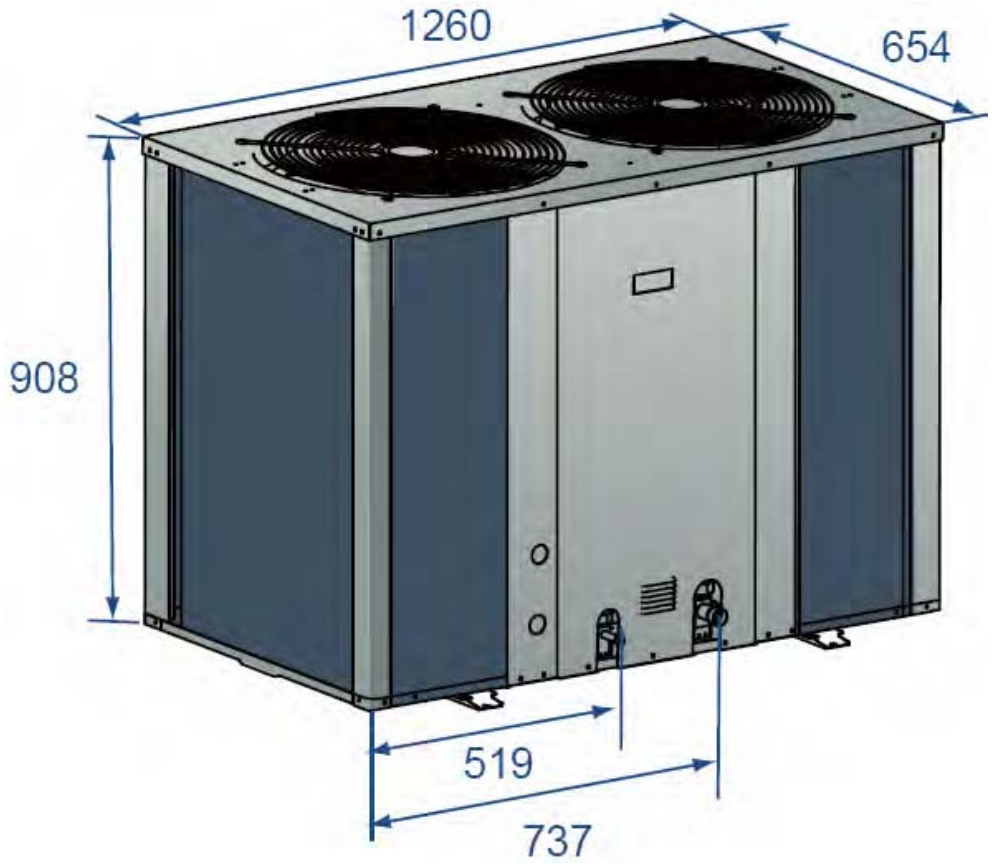
2. Dimension (Units: mm)

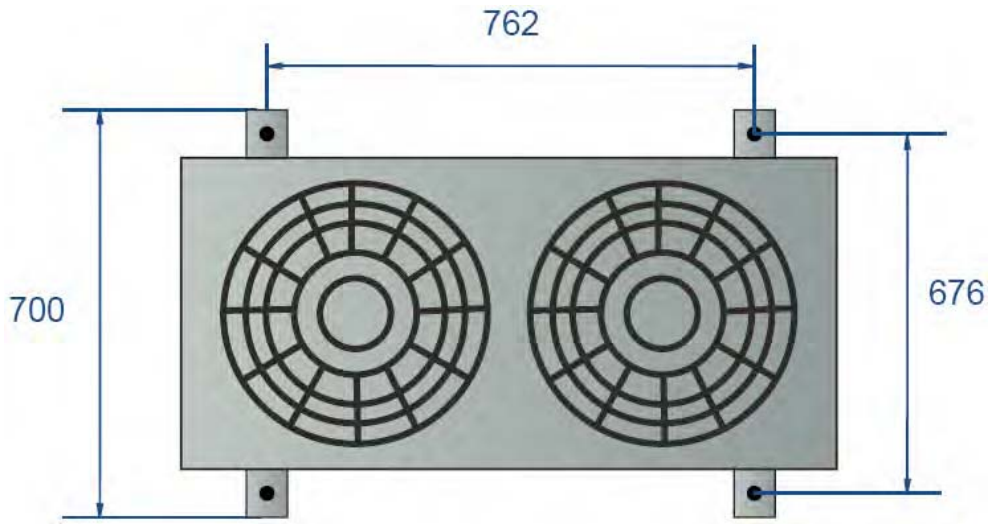
2.1 ASE-76AH, ASE-96AH





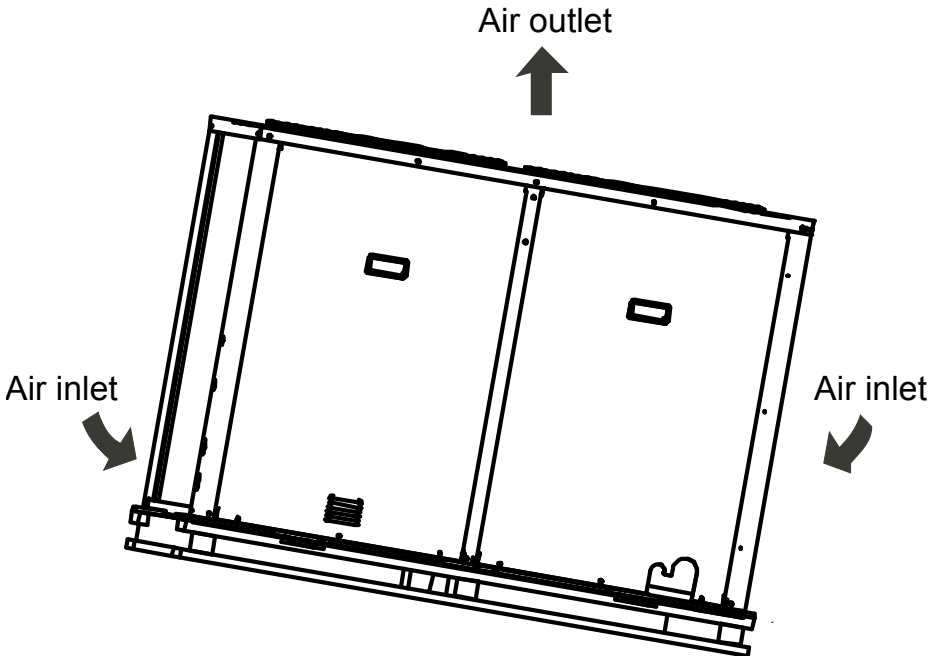
2.2 ASE-120AH

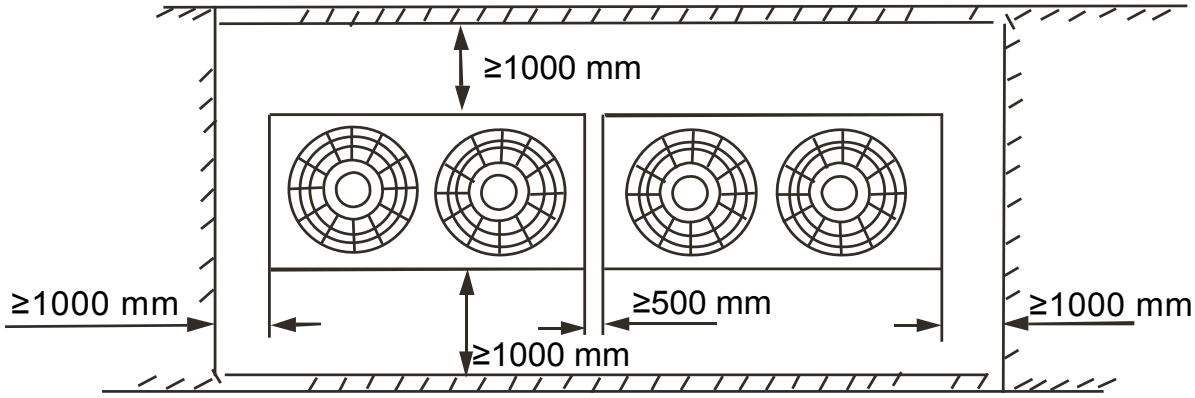




3. Service Space

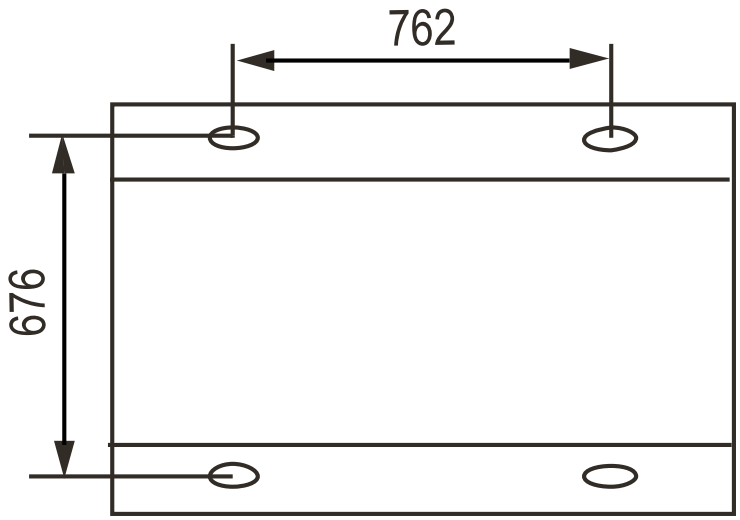
3.1 ASE-76AH, ASE-96AH, ASE-120AH

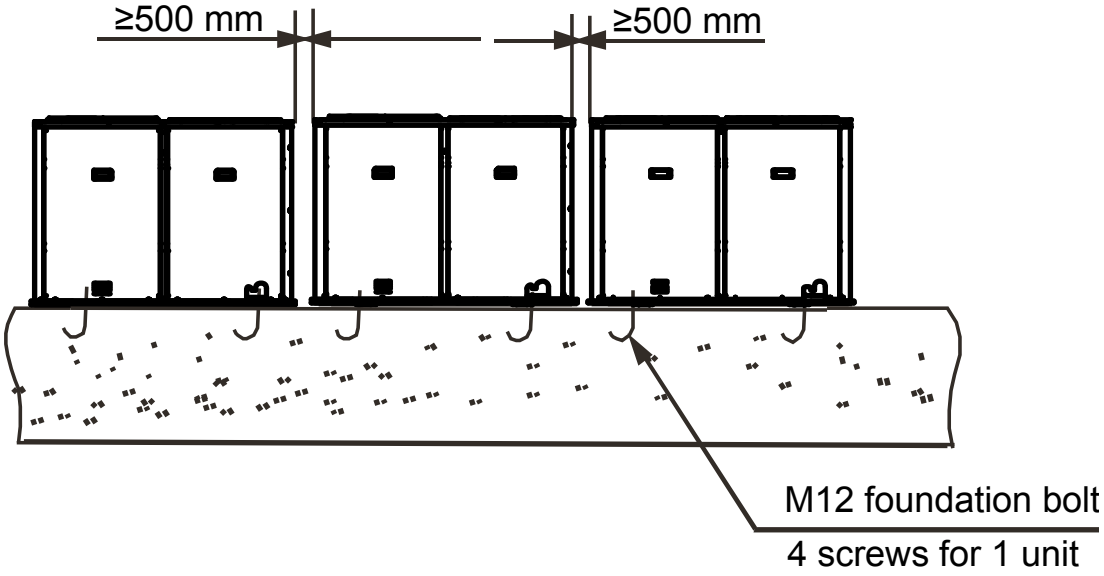




Note:
1. In case any obstacles exist above the outdoor unit, such obstacles must be 2000mm above the outdoor unit.
2. If miscellaneous articles are piled around the outdoor unit, such articles must be 400mm below the top of the outdoor unit.

Foundation of the outdoor unit

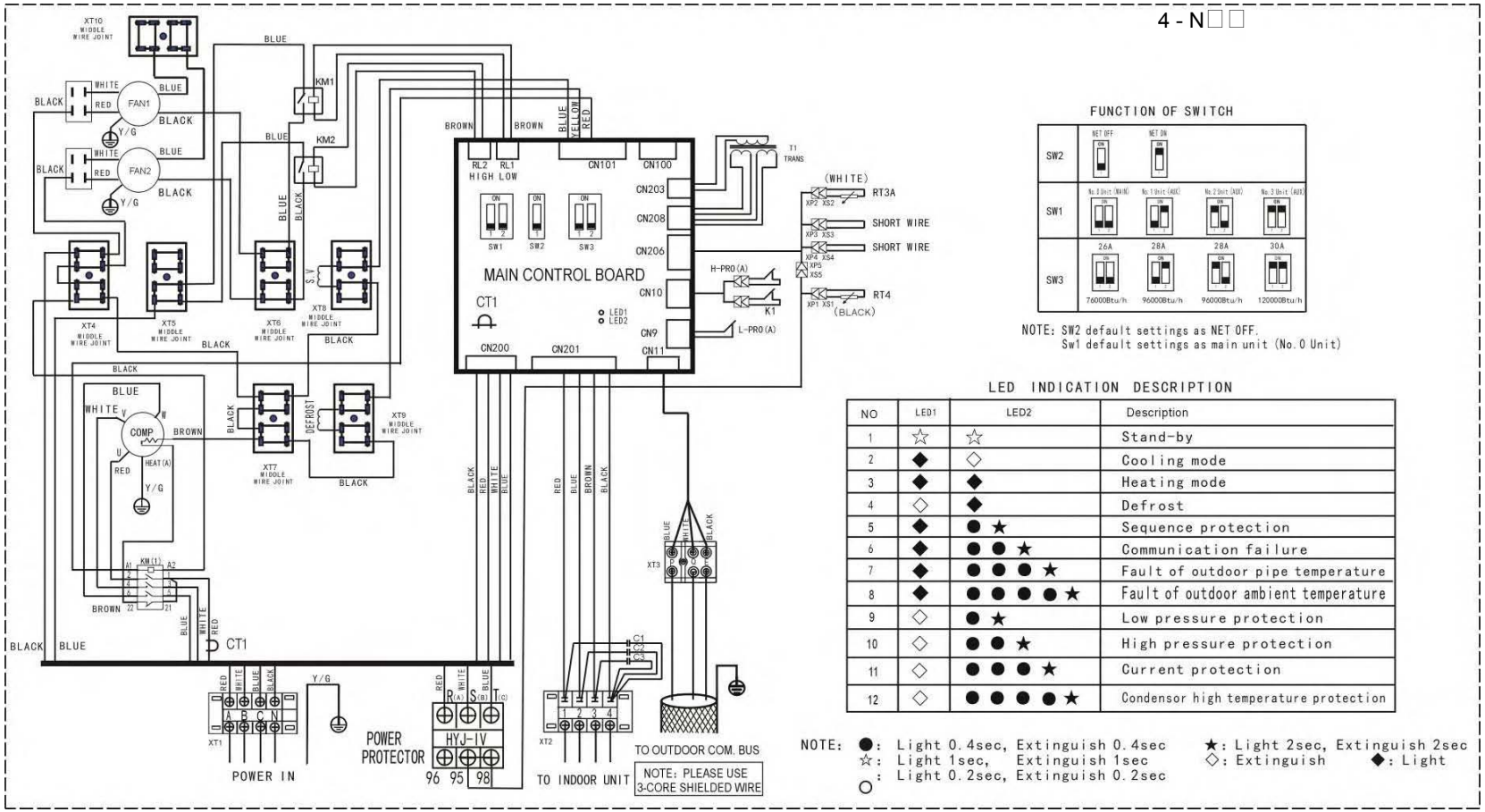




4. Wiring Diagrams

4.1 ASE-76AH, ASE-96AH, ASE-120AH

1 - Compressor Output
2 - S.V.O (4 Way Valve Output)
3 - FAN Output
4 - N□ □


MAIN CONTROL BOARD
FUNCTION OF SWITCH
SW2
SW1
SW3
NOTE: SW2 default settings as NET OFF.
Sw1 default settings as main unit (No.0 Unit)
LED INDICATION DESCRIPTION
NO | LED1 | LED2 | Description
1 | ☆ | ☆ | Stand-by
2 | ◆ | ◇ | Cooling mode
3 | ◆ | ◆ | Heating mode
4 | ◇ | ◆ | Defrost
5 | ◆ | ● ★ | Sequence protection
6 | ◆ | ● ● ★ | Communication failure
7 | ◆ | ● ● ● ★ | Fault of outdoor pipe temperature
8 | ◆ | ● ● ● ● ★ | Fault of outdoor ambient temperature
9 | ◇ | ● ★ | Low pressure protection
10 | ◇ | ● ● ★ | High pressure protection
11 | ◇ | ● ● ● ★ | Current protection
12 | ◇ | ● ● ● ● ★ | Condensor high temperature protection
NOTE: ●: Light 0.4sec, Extinguish 0.4sec ★: Light 2sec, Extinguish 2sec
☆: Light 1sec, Extinguish 1sec ◇: Extinguish ◆: Light
○: Light 0.2sec, Extinguish 0.2sec
POWER IN
POWER PROTECTOR
HYJ-IV
TO INDOOR UNIT
TO OUTDOOR COM. BUS
NOTE: PLEASE USE 3-CORE SHIELDED WIRE

Item	Name	Item	Name	Item	Name	Item	Name
COMP	Compressor	HEAT(A)	Crank	RT3A	Pipe temp. sensor	T1	Transformer
FAN1-2	Outdoor fan	CT1	Current detector	RT4	Room temp. sensor	SW1-3	Switch
CAP1-2	Fan capacitance	XT1-2	4-way terminal	XS1-5, XP1-5	Connectors	C1-3	Filter capacitor
S.V	4-way valve	XT3	3-way terminal	L-PRO(A)	Low pressure switch	KM1-2	Relay
KM(1)	AC contactor	H-PRO(A)	High pressure switch	K1	Temp. protect switch	CN8-208	P.C. board socket
XT4-10	Middle wire joint	-	-	-	-	-	-

5. Electric Characteristics

Model	Outdoor Unit				Power Supply			Compressor		OFM	
	Hz	Voltage	Min.	Max.	MCA	TOCA	MFA	MSC	RLA	KW	FLA
ASE-76AH	50	380-415	342	438	17.5	18	20.5	86	16.5	0.573	2.613
ASE-96AH	50	380-415	342	438	20	21	23.8	110	20	1.373	6.26
ASE-120AH	50	380-400	342	440	25	28.6	30	147	21.4	1.373	6.26

Remark:
MCA: Min. Current Amps. (A)
TOCA: Total Over-current Amps. (A)
MFA: Max. Fuse Amps. (A)
MSC: Max. Starting Amps. (A)
RLA: Rated Locked Amps. (A)
OFM: Outdoor Fan Motor.
FLA: Full Load Amps. (A)
KW: Rated Motor Output (kW)

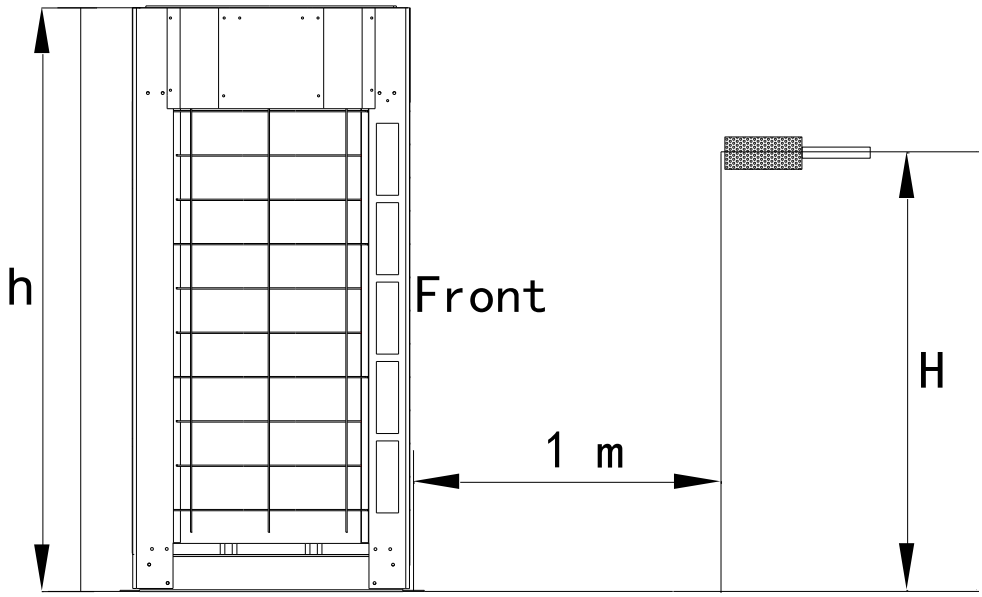
6. Operation Limits

Temperature range for unit operation:

Item / Model	Cooling mode		Heating mode	
	Outdoor	Indoor	Outdoor	Indoor
All model	21℃~52℃	17℃～32℃	-10℃~24℃	20℃～27℃

7. Sound Levels

Standard of testing

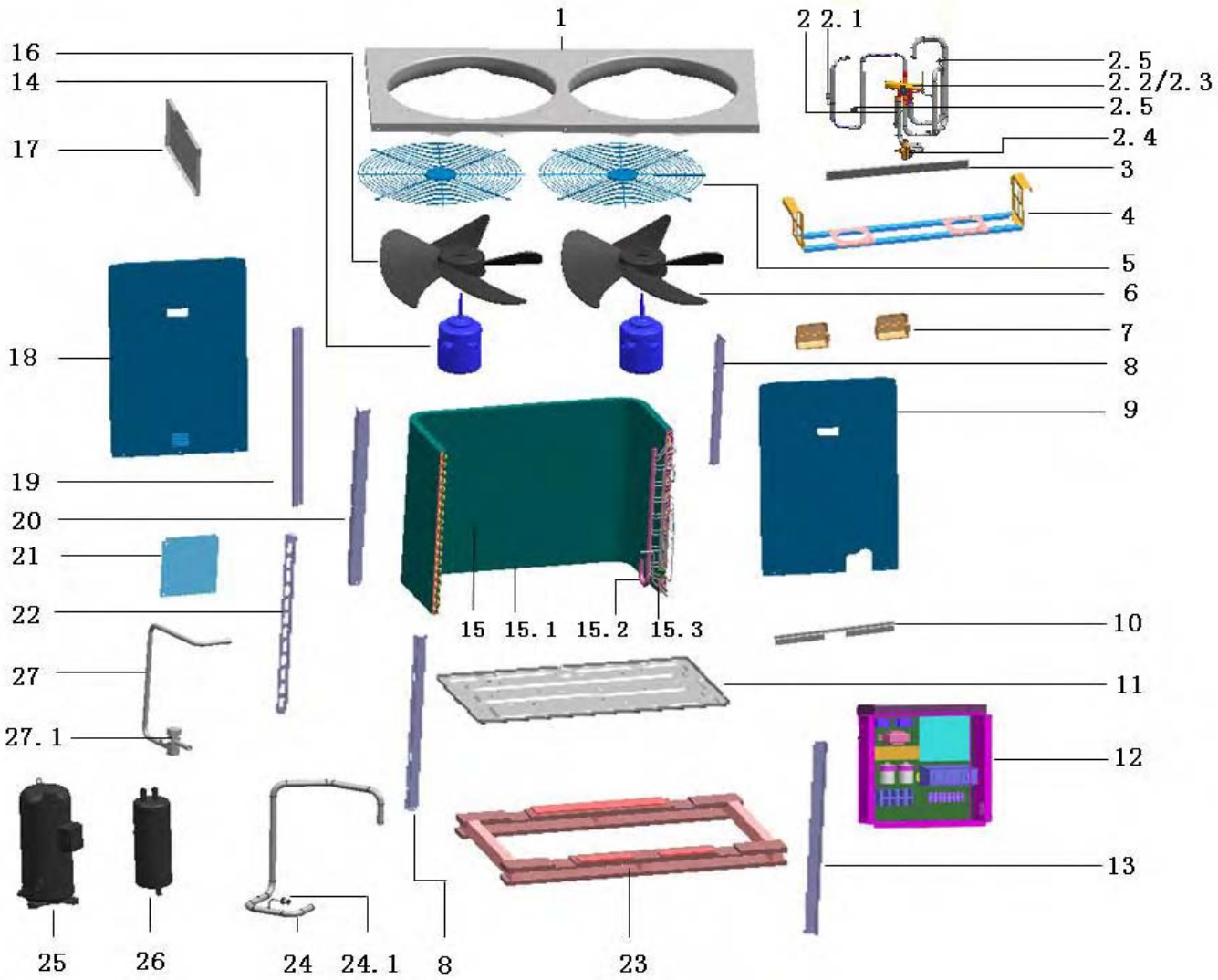


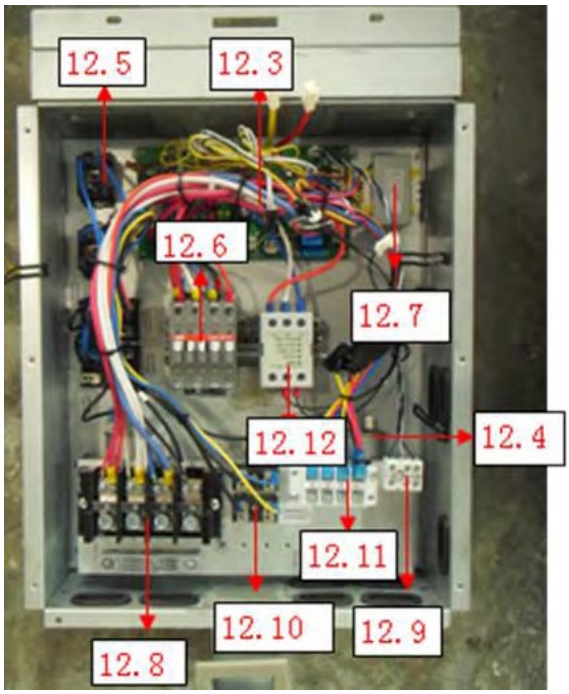
Note: H = (h+1) / 2

Model	H
ASE-76AH	63
ASE-96AH	64
ASE-120AH	65

8. Exploded View

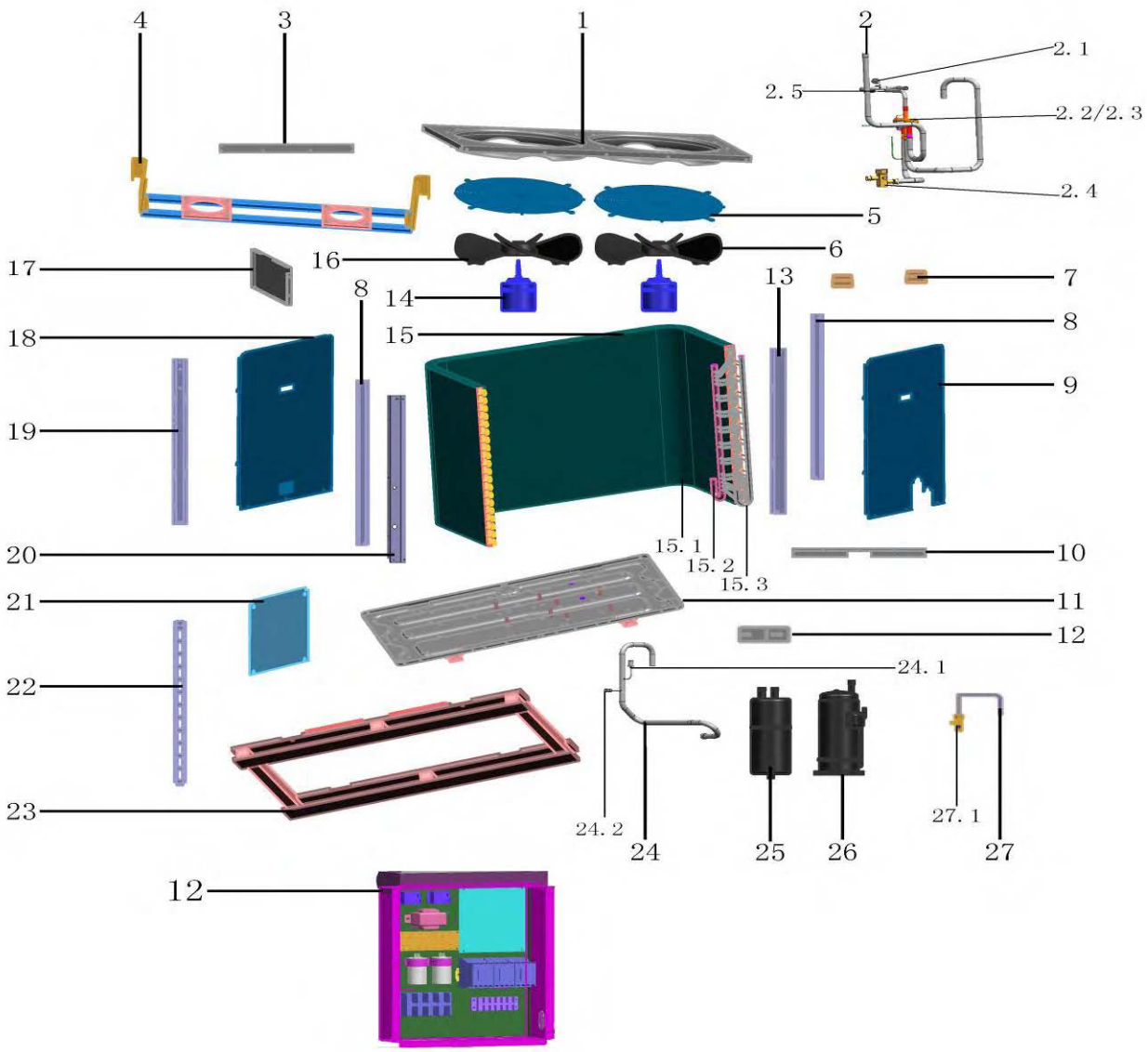
8.1 ASE-76AH





No.	Part Name	QTY	BOM Code	No.	Part Name	QTY	BOM Code
1	top cover welding part	1	201275990072	12.9	Wire joint	1	202301450121
2	four-way valve ass'y	1	201675990299	12.10	Wire joint	7	202301450122
2.1	Pressure controller	1	202301820042	12.11	Wire joint	1	202301450130
2.2	4-way valve	1	201600600110	12.12	Three-phase power protection devices	1	202301600518
2.3	4-Ways valve solenoid	1	201600600179	13	front-right support pillar	1	201275990070
2.4	Valve body	1	201601600314	14	asynchronism fan motor	2	202400400563
2.5	Pipe joint	2	201601200004	15	condensor ass'y	1	201575990016
3	Electronic control box mounting plate	1	201275990060	15.1	condensor	1	201575990007
4	fan motor supproting ass'y	1	201275990073	15.2	condensor input pipe ass'y	1	201675990282
5	The air grille	2	201275990062	15.3	condensor output ass'y	1	201675990281
6	Axial fan	1	201200300014	16	Axial fan	1	201200300035
7	Handle	2	201148700003	17	The partition	1	201275990066
8	After the column about	2	201275990068	18	Left panel	1	201275990064
9	Right front panel	1	201275990063	19	Before the column	1	201275990069
10	Under electronic control box mounting plate	1	201275990061	20	front-left pillar ass'y	1	201275990095
11	Chassis Parts	1	201275990097	21	Electronic control box cover	1	201275990065
12	outdoor electric box ass'y	1	203375990018	22	back middle pillar	1	201275990092
12.1	electric box welding ass'y	1	201275990107	23	Wooden chassis	1	202675990010
12.2	wiring base installation ass'y	1	201275990087	24	compressor suction pipe ass'y	1	201675990302
12.3	Outdoor control board assembly	1	201375990006	24.1	pressure controller	1	202301800953
12.4	Capacitor	2	202300320025	25	Gas-liquid separator	1	201601100097
12.5	Relay	2	202300800071	26	coopland compressor	1	201401400710
12.6	AC contactor	1	202300850050	27	high pressure valve ass'y	1	201675990293
12.7	Transformer	1	202300900093	27.1	Valve body	1	201601600312
12.8	Wire joint	1	202301450110	-	-	-	-

8.2 ASE-96AH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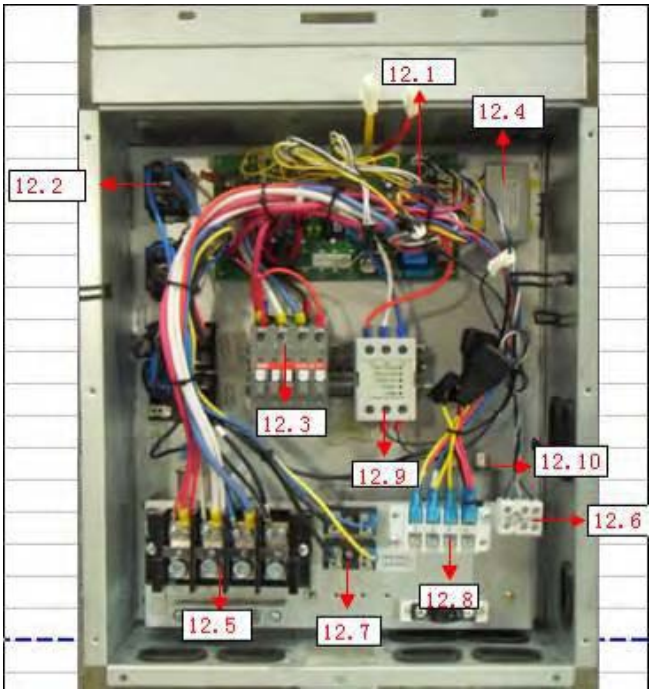
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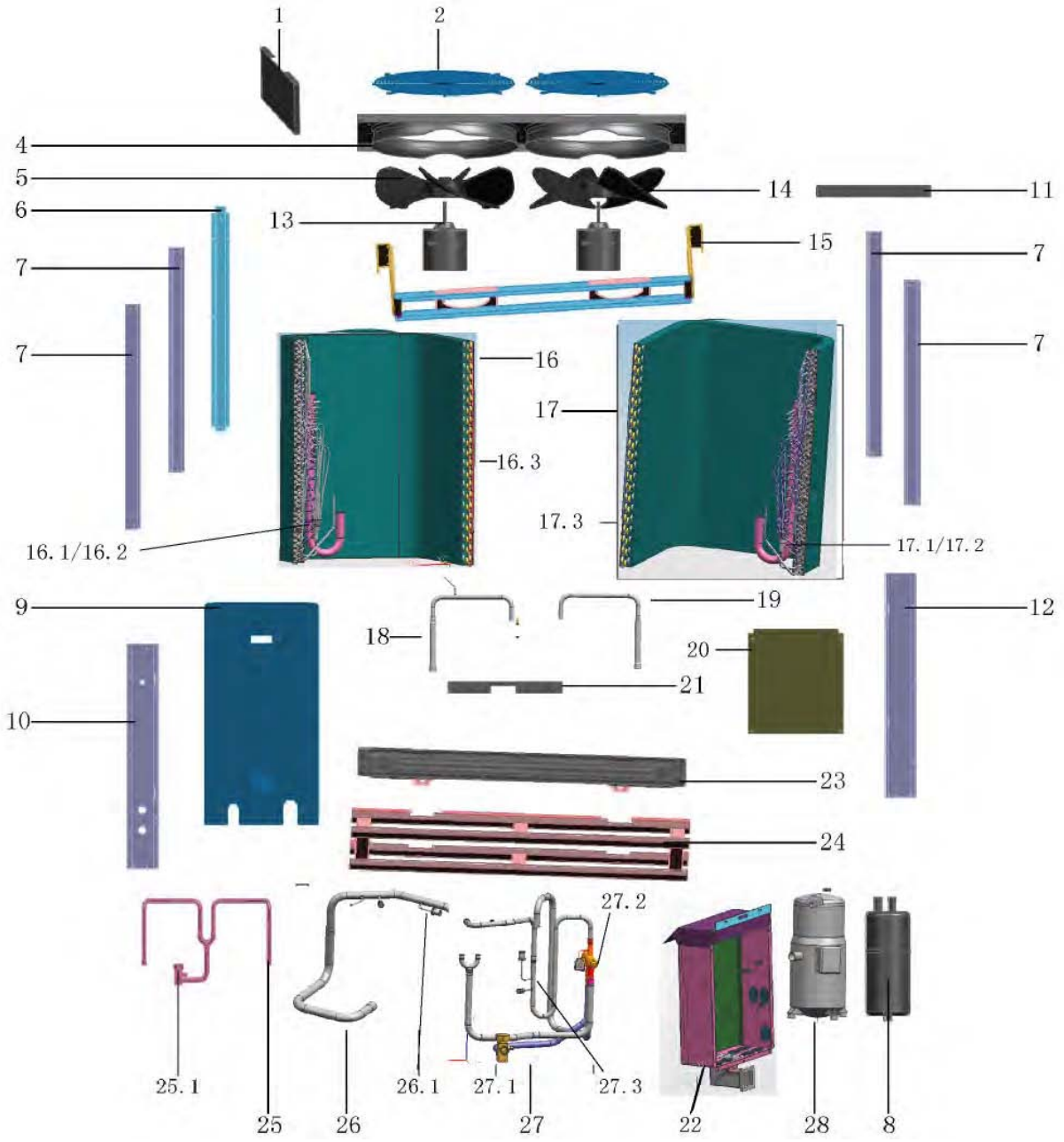
12. 3
12. 9
12. 10
12. 6
12. 8
12. 5
12. 7

No.	Part Name	QTY	BOM Code	No.	Part Name	QTY	BOM Code
1	Welding together pieces of roof	1	201275990102	12.8	Wire joint	1	202301450130
2	Four-way valve assembly	1	201675990271	12.9	Three-phase power protection devices	1	202301600518
2.1	Pressure controller	1	202301820042	12.10	Compressor capacitor	2	202401000410
2.2	4-way valve	1	201600600110	13	Front right column	1	201275990109
2.3	4-Ways valve solenoid	1	201600600113	14	Induction motor	2	202400400456
2.4	Cube Valve	1	201601601291	15	Condenser components	1	201575990014
2.5	Pipe joint	1	201601200004	15.1	Condenser	1	201575990015
3	Electronic control box mounting plate	1	201275990060	15.2	Input tube condenser components	1	201675990258
4	Motor bracket assembly	1	201275990106	15.3	Output tube condenser components	1	201675990244
5	The air grille	2	201275990062	16	Axial fan	1	201200300035
6	Axial fan	1	201200300014	17	The partition	1	201275990066
7	Handle	2	201148700003	18	Left panel	1	201275990064
8	After the column about	2	201275990068	19	Before the column	1	201275990069
9	Right front panel	1	201275990063	20	Components before the left column	1	201275990104
10	Under electronic control box mounting plate	1	201275990061	21	Electronic control box cover	1	201275990065
11	Chassis Parts	1	201275990097	22	After the column	1	201275990067
12	Outdoor electronic control box components	1	203375990015	23	Wooden chassis	1	202675990010
12.1	Outdoor control board assembly	1	201375990006	24	Components of the compressor back to the trachea	1	201675990267
12.2	Relay	2	202300800071	24.1	Pressure controller	1	202301820021
12.3	Contactor	1	202300850034	24.2	Pipe joint	1	201601200004
12.4	Transformer	1	202300900093	25	Gas-liquid separator	1	201601100097
12.5	Wire joint	1	202301450110	26	Copeland Compressor	1	201401400620
12.6	Wire joint	1	202301450121	27	High-pressure valve assembly	1	201675990269
12.7	Wire joint	7	202301450122	27.1	Cube Valve	1	201601600316

8.3 ASE- 1 2 0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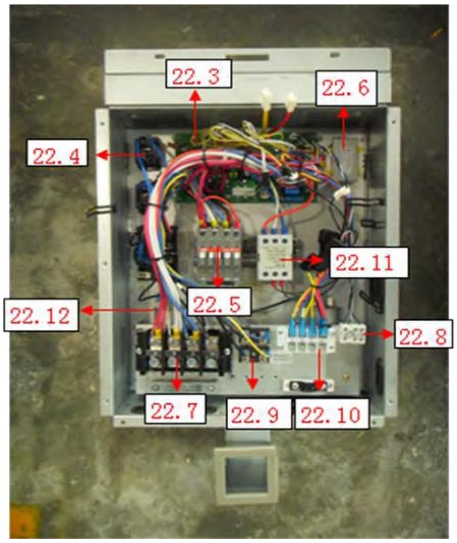
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22.10

No.	Part Name	QTY	BOM Code	No.	Part Name	QTY	BOM Code
1	The partition	1	201275990085	21	Bottom mounting plate of electronic control box	1	201275990079
2	The air grille	2	201275990062	22	Outdoor electronic control box components	1	203375990015
4	Welding together pieces of roof	1	201275990102	22.1	electric box welding ass'y	1	201275990107
5	Axial fan	1	201200300035	22.2	wiring base installation ass'y	1	201275990087
6	After the column	1	201275990117	22.3	Outdoor control board assembly	1	201375990006
7	After the column about	4	201275990068	22.4	Relay	2	202300800071
8	Gas-liquid separator	1	201601100097	22.5	Contactor	1	202300850034
9	Front panel	1	201275990084	22.6	Transformer	1	202300900093
10	Components before the left column	1	201275990118	22.7	Wire joint	1	202301450110
11	Top mounting plate of electronic control box	1	201275990080	22.8	Wire joint	1	202301450121
12	Front right column	1	201275990116	22.9	Wire joint	7	202301450122
13	Induction motor	2	202400400456	22.10	Wire joint	1	202301450130
14	Axial fan	1	201200300014	22.11	Three-phase power protection devices	1	202301600518
15	Motor bracket assembly	1	201275990106	22.12	Compressor capacitor	2	202401000410
16	Condenser ass'y II	1	201575990019	23	Chassis Parts	1	201275990111
16.1	Inlet pipe ass'y of condenser	1	201675990337	24	Wooden chassis	1	202675990010
16.2	Outlet pipe ass'y of condenser	1	201675990345	25	High pressure valve ass'y	1	201675990363
16.3	Condenser II	1	201575990020	25.1	Cube Valve	1	201601600316
17	Condenser ass'y I	1	201575990017	26	Suction pipe ass'y of compressor	1	201675990356
17.1	Inlet pipe ass'y of condenser	1	201675990305	26.1	pressure controller	1	202301800953
17.2	Outlet pipe ass'y of condenser	1	201675990321	27	4-way valve ass'y	1	201675990359
17.3	Condenser I	1	201575990018	27.1	Cube Valve	1	201601601292
18	Inlet pipe ass'y II of condenser	1	201675990384	27.2	4-way valve	1	201600600110
19	Inlet pipe ass'y of condenser	1	201675990367	27.3	Pressure controller	1	202301820020
20	Electronic control box cover	1	201275990065	28	Compressor	1	201402300130

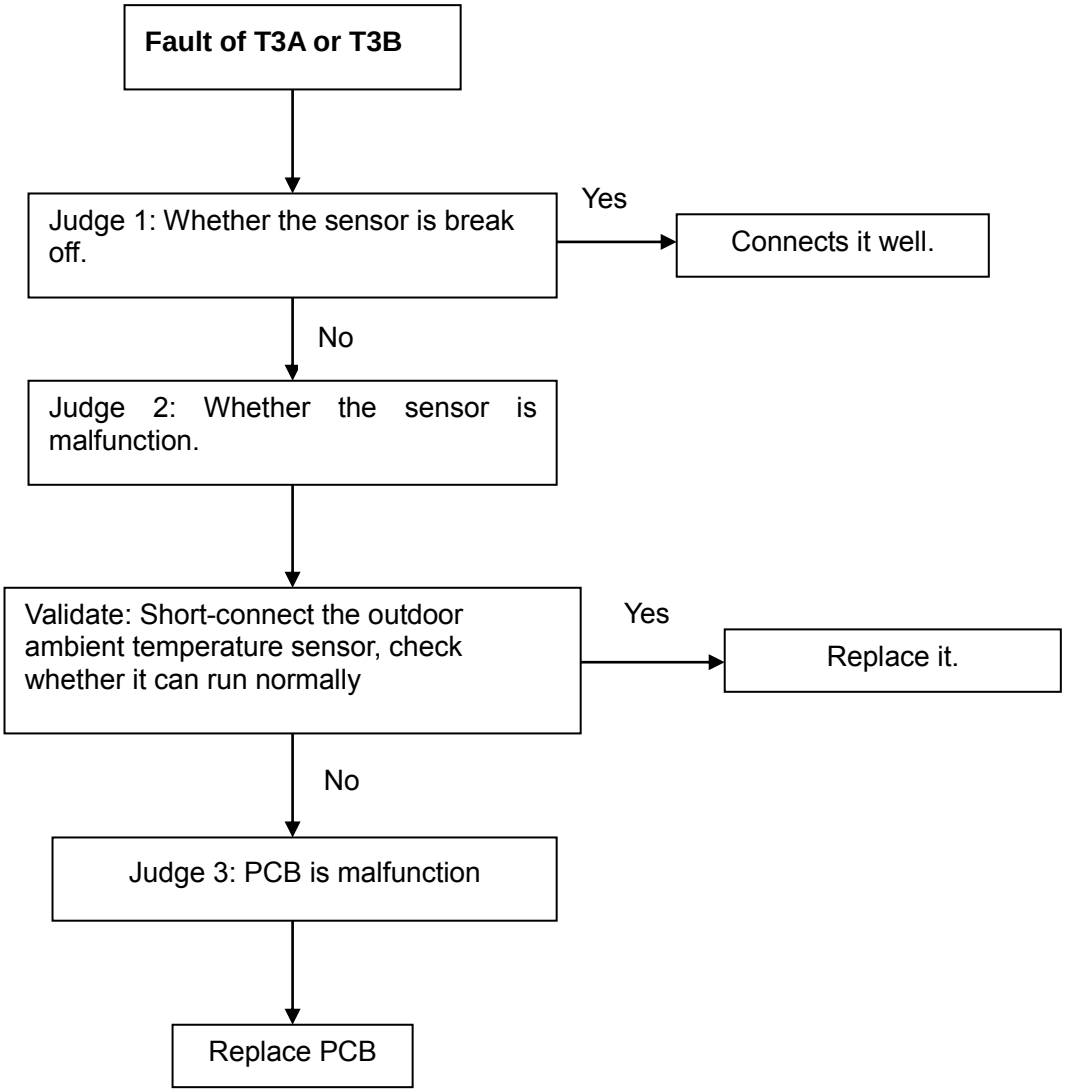
9. Troubleshooting

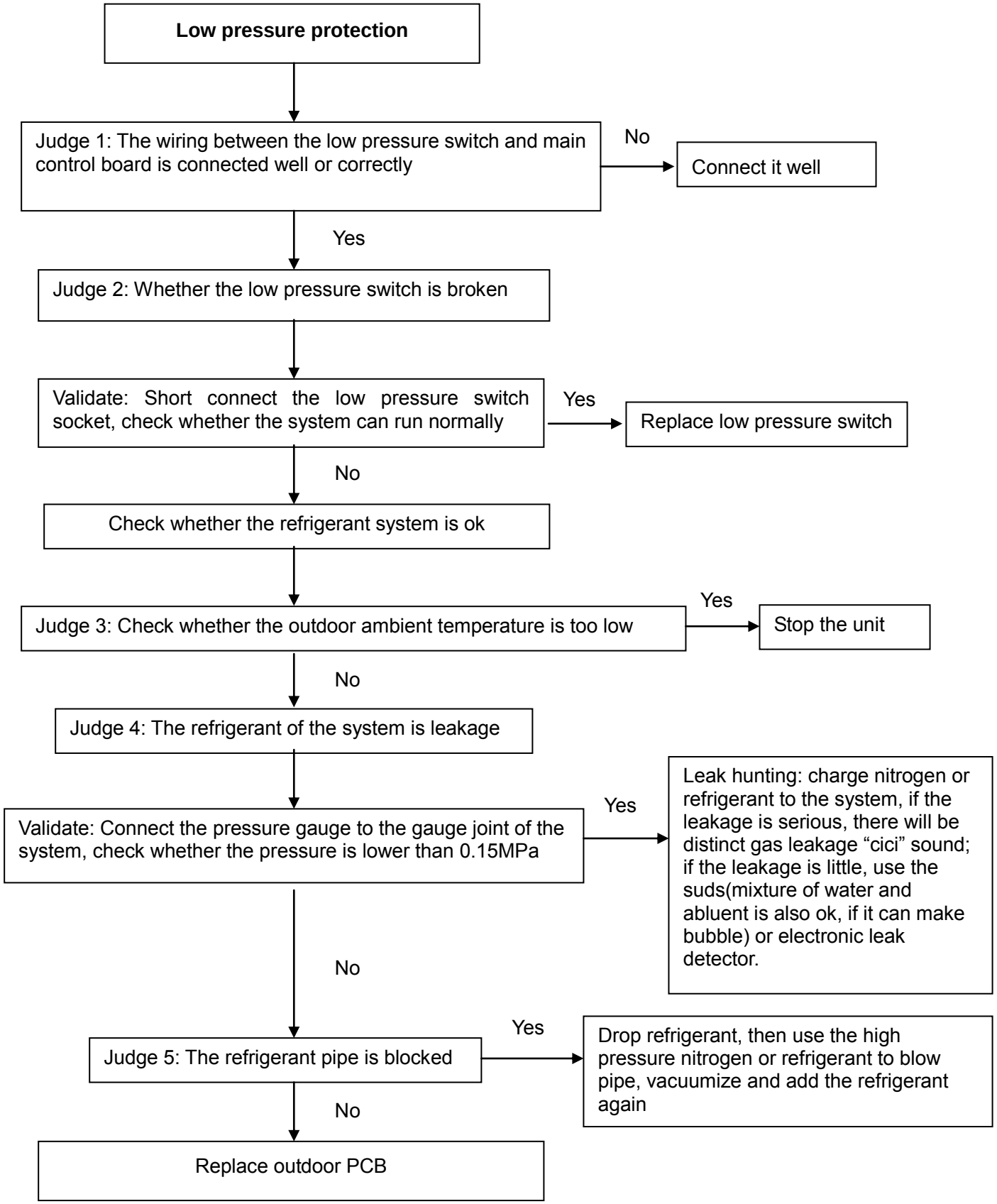
Type	LED1	LED2	Remarks
Standby	☆	☆	-
Cooling mode	◆	◇	-
Heating mode	◆	◆	-
Defrosting mode	◇	◆	-
Phase sequence protection	◆	●★	Manual reset
Communication failure	◆	●●★	Manual reset
Outdoor condenser temp. sensor error	◆	●●●★	Manual reset
Outdoor ambient temp. sensor error	◆	●●●●★	Manual reset
Protection of low pressure	◇	●★	Auto reset
Protection of high pressure	◇	●●★	Auto reset
Protection of over-current	◇	●●●★	Auto reset
Protection of condenser hi-temp.	◇	●●●●★	Auto reset

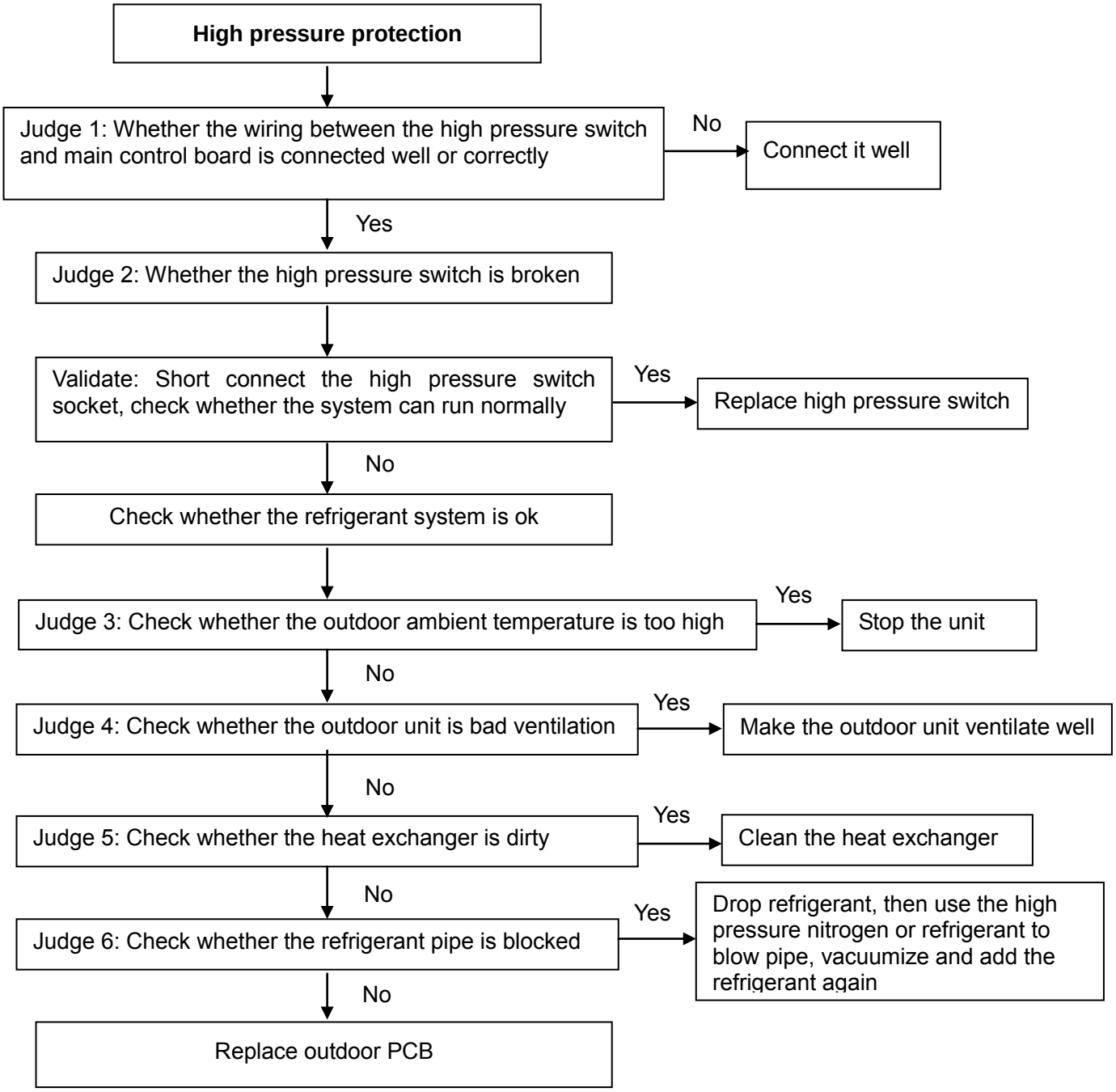
Note:
☆: Light for 1 second, extinguish for 1 second;
◆: Light;
◇: Extinguish;
●: Light for 0.4 second, extinguish for 0.4 second;
★: Light for 2 second, extinguish for 2 second.

10. Malfunctions:

About the Fault of T3A or T3B, High pressure protection, low pressure protection. Please refer to the following:


Fault of T3A or T3B
Judge 1: Whether the sensor is break off.
Yes
Connects it well.
No
Judge 2: Whether the sensor is malfunction.
Validate: Short-connect the outdoor ambient temperature sensor, check whether it can run normally
Yes
Replace it.
No
Judge 3: PCB is malfunction
Replace PCB


Low pressure protection
Judge 1: The wiring between the low pressure switch and main control board is connected well or correctly
No
Connect it well
Yes
Judge 2: Whether the low pressure switch is broken
Validate: Short connect the low pressure switch socket, check whether the system can run normally
Yes
Replace low pressure switch
No
Check whether the refrigerant system is ok
Judge 3: Check whether the outdoor ambient temperature is too low
Yes
Stop the unit
No
Judge 4: The refrigerant of the system is leakage
Validate: Connect the pressure gauge to the gauge joint of the system, check whether the pressure is lower than 0.15MPa
Yes
Leak hunting: charge nitrogen or refrigerant to the system, if the leakage is serious, there will be distinct gas leakage “cici” sound; if the leakage is little, use the suds(mixture of water and abluent is also ok, if it can make bubble) or electronic leak detector.
No
Judge 5: The refrigerant pipe is blocked
Yes
Drop refrigerant, then use the high pressure nitrogen or refrigerant to blow pipe, vacuumize and add the refrigerant again
No
Replace outdoor PCB


High pressure protection
Judge 1: Whether the wiring between the high pressure switch and main control board is connected well or correctly
No
Connect it well
Yes
Judge 2: Whether the high pressure switch is broken
Validate: Short connect the high pressure switch socket, check whether the system can run normally
Yes
Replace high pressure switch
No
Check whether the refrigerant system is ok
Judge 3: Check whether the outdoor ambient temperature is too high
Yes
Stop the unit
No
Judge 4: Check whether the outdoor unit is bad ventilation
Yes
Make the outdoor unit ventilate well
No
Judge 5: Check whether the heat exchanger is dirty
Yes
Clean the heat exchanger
No
Judge 6: Check whether the refrigerant pipe is blocked
Yes
Drop refrigerant, then use the high pressure nitrogen or refrigerant to blow pipe, vacuumize and add the refrigerant again
No
Replace outdoor PCB

Part 3 Installation

1. Note 26

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5. Installation of Drain Pipe.....41

6. Electric Connection.....42

7. Methods of configuring and selecting installation....45

1. Note

CAUTION:

- Install the unit where enough space of installation and maintenance is available.
- Install the unit where the ceiling is horizontal and enough for bearing the weight of the indoor unit.
- Install the unit where the air inlet and outlet are not baffled and are the least affected by external air.
- Install the unit where the supply air flow can be sent to all parts in the room.
- Install the unit where it is easy to lead out the connective pipe and the drain pipe.
- Install the unit where no heat is emitted from a heat source directly.
- Installing the equipment in any of the following places may lead to faults of the equipment (if that is inevitable, consult the supplier):

- The site contains mineral oils such as cutting lubricant.
- Seaside where the air contains much salt.
- Hot ring area where corrosive gases exist, e.g., sulfide gas.
- Factories where the supply voltage fluctuates seriously.
- Inside a car or cabin.
- Place like kitchen where oil permeates.
- Place where strong electromagnetic waves exist.
- Place where flammable gases or materials exist.
- Place where acid or alkali gases evaporate.
- Other special environments.

- Install the unit where enough space of installation and maintenance is available.
- Install the unit where the air inlet and air outlet are free from obstacles and strong wind.
- Install the unit in a dry and well ventilated place.
- Install the unit where the bearing surface is level and can bear weight of the unit, and is suitable for installing the unit horizontally without increasing noise or vibration.
- Install the unit where the operation noise and the expelling of air do not affect neighbors.
- Install the unit where no flammable gas is leaked.
- Install the unit where it is convenient for pipe connection and electric connection.

2. Installation of Outdoor Units

2.1 Important: Construction Checkpoints

1). Installation
Check the model and name to avoid mistaken installation.

2). Refrigerant pipe
- The refrigerant pipes must have the specified diameter.
- Nitrogen of a certain pressure must be filled into the refrigerant pipe before welding.
- The refrigerant pipe must undergo heat insulation treatment.
- After the refrigerant pipe is installed completely, the indoor unit cannot be powered on before performing the airtight test and creating a vacuum.

3). Pressure test
The refrigerant pipe must undergo the airtight test [with 2.94MPa (30kgf/cm^{2}G) nitrogen].

4). Creating a vacuum
Be sure to use the vacuum pump to create a vacuum of the connective pipe at both air side and liquid side concurrently.

5). Refrigerant replenishment
- If the pipe is longer than the reference pipe, the refrigerant replenishment quantity for each outdoor unit should be calculated through the formula obtained according to the actual length of the pipe.
- Record the refrigerant replenishment quantity, actual length of pipe and the height difference of the indoor & outdoor units onto the operation confirmation table (on the electric control box) of the outdoor unit in advance for future reference.

6). Electric wiring
- Select the power supply capacity and wire size according to the design manual. The power wire size of the air conditioner should be greater than that of ordinary motors.
- In order to prevent disoperation of the air conditioner, do not interleave or entwine the power cable (380~415V/3N/50Hz) with the connection wires (low-voltage wires) of the indoor/outdoor unit.
- Power on the indoor unit after performing the airtight test and making a vacuum.

7). Trial run
Perform the trial run only after the outdoor unit has been powered on for over 12 hours.

2.2 Installation Space

- When installing the unit, leave a space for maintenance shown in the following figure. Install the power supply at the side of the outdoor unit.
- Ensure enough space for installation and maintenance. (Fig-14 and Fig-15)

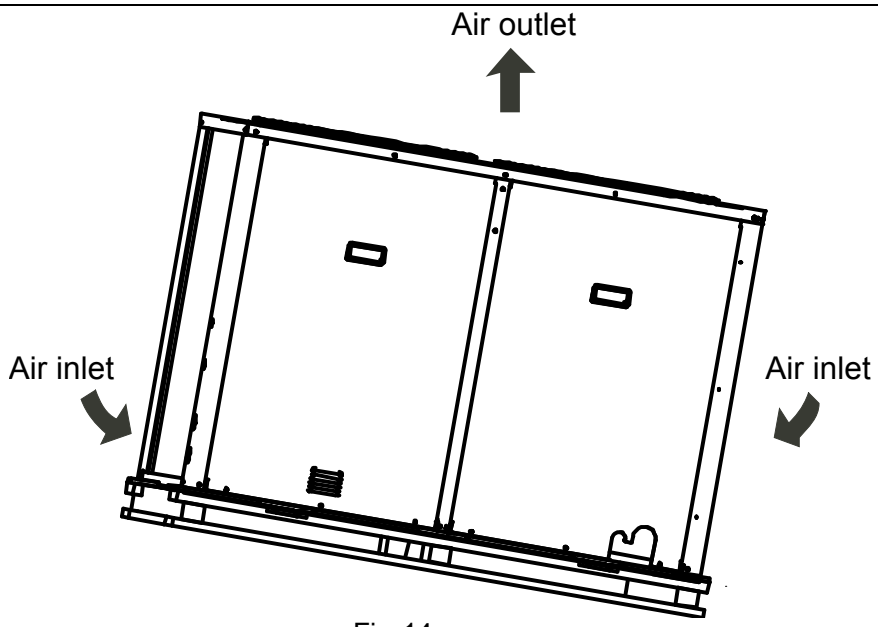


Fig-14

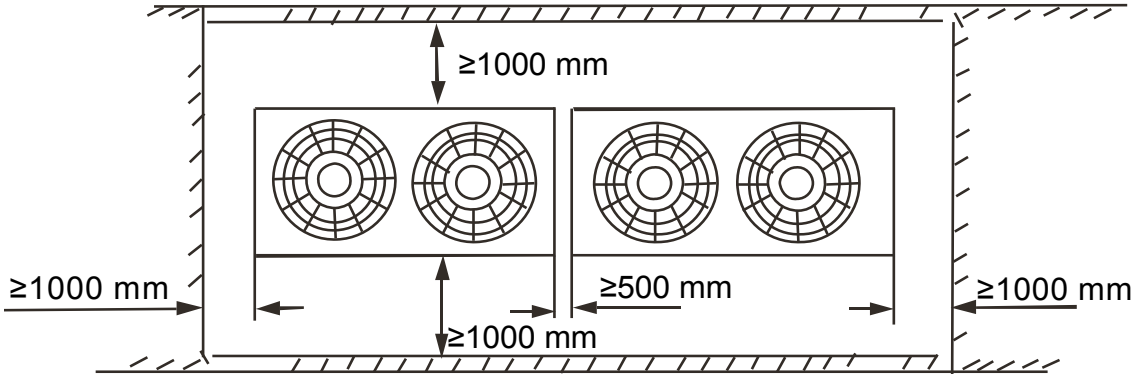


Fig-15

NOTE:

1. In case any obstacles exist above the outdoor unit, such obstacles must be 2000mm above the outdoor unit.

2. If miscellaneous articles are piled around the outdoor unit, such articles must be 400mm below the top of the outdoor unit.

As shown in Fig-16, leave an interval of 500mm between the outdoor units.

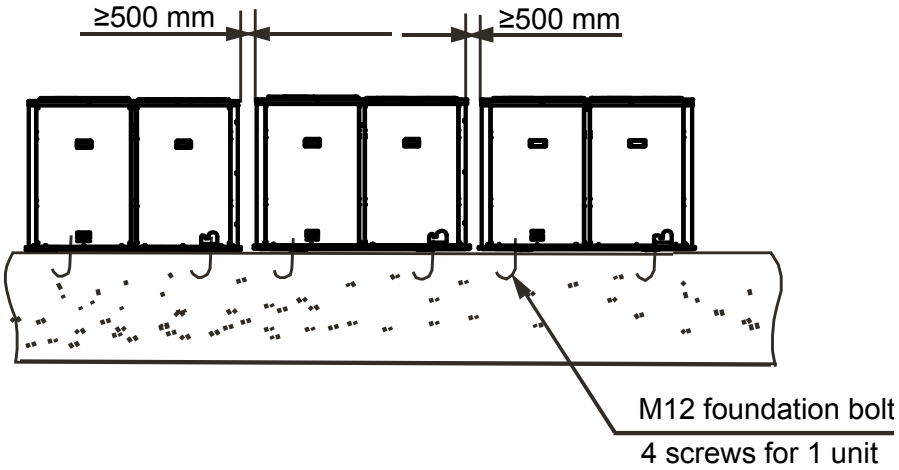


Fig-16

The distance of the foundation bolt is shown in Fig-17.

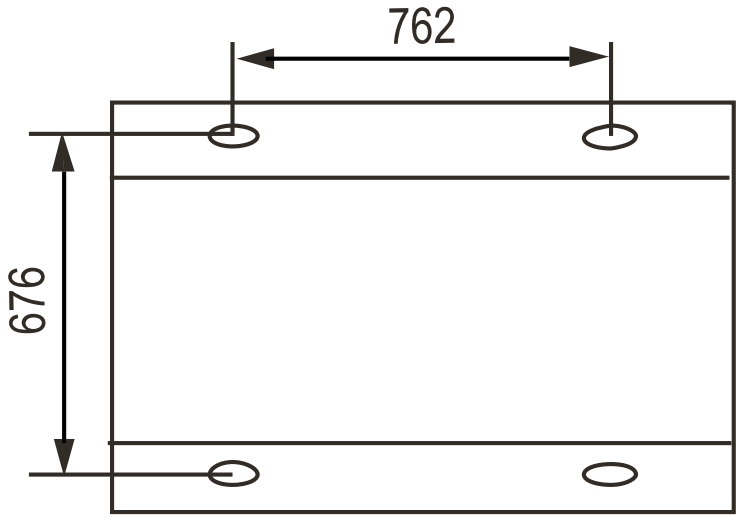


Fig-17

2.3 Convey Outdoor Unit

- Use 4 steel ropes of a Φ6mm or bigger size to hoist the outdoor unit and convey it into the room.
- In order to prevent scratch and deformity the outdoor unit, apply a guard board to the surface of contact between the steel ropes and the air conditioner.
- Remove the cushion for use in the transport after finishing the transport. (Fig-18)
- Fork truck can be used for conveying.

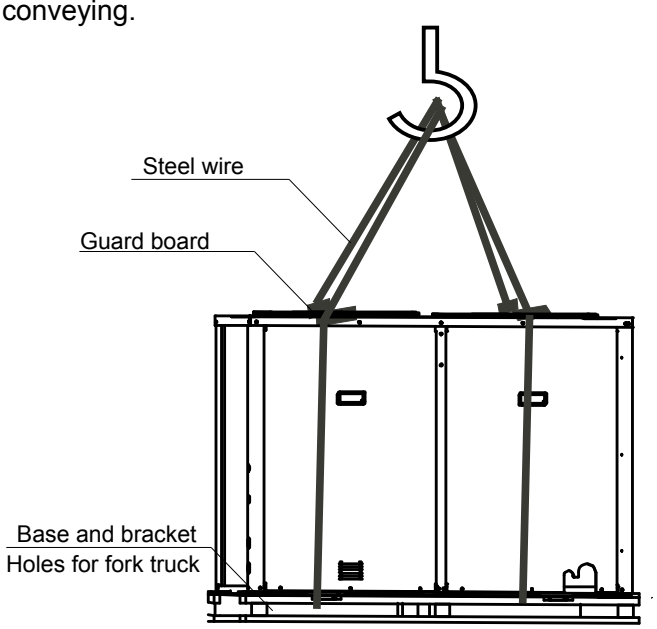


Fig-18

2.4 Snow protection facilities must be installed in the snowfall areas. (Fig-19)

In case the snow protection facilities are incomplete, faults may occur. In order to prevent influence caused by snow, set up raised pavilion, and install snow protection sheds at the air inlet and air outlet.

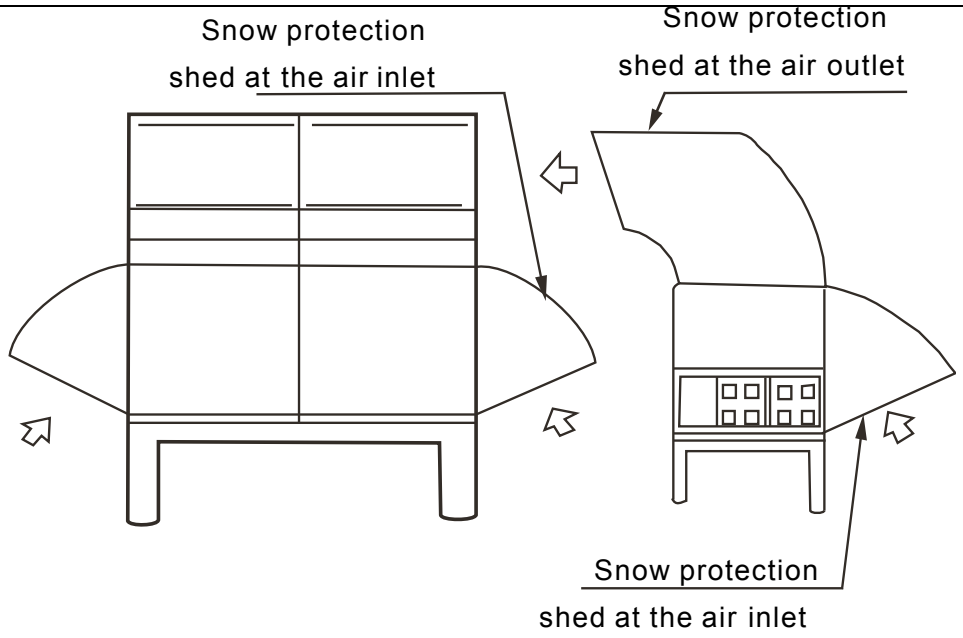


Fig-19

2.5 Installation of Refrigerant Pipe

- The refrigerant pipe adapter is located inside the outdoor unit. When the pipe is connected from the front side, the pipe can be let out through the right front board. (Fig-20 and Fig-21) So remove the left front board first. (Three M5 screws)
- The pipe can be connected from the front left lower side or the bottom notch of the outdoor unit.
- When the pipe is connected from the front side, the pipe can be led out through the pipe & wire panel.
- In case the pipe is connected from the bottom notch, install it leftward, rightward or backward after leading it out.
- When the pipe is led from the front, use a cover plate to seal the bottom notch in order to prevent intrusion of dust or trash.

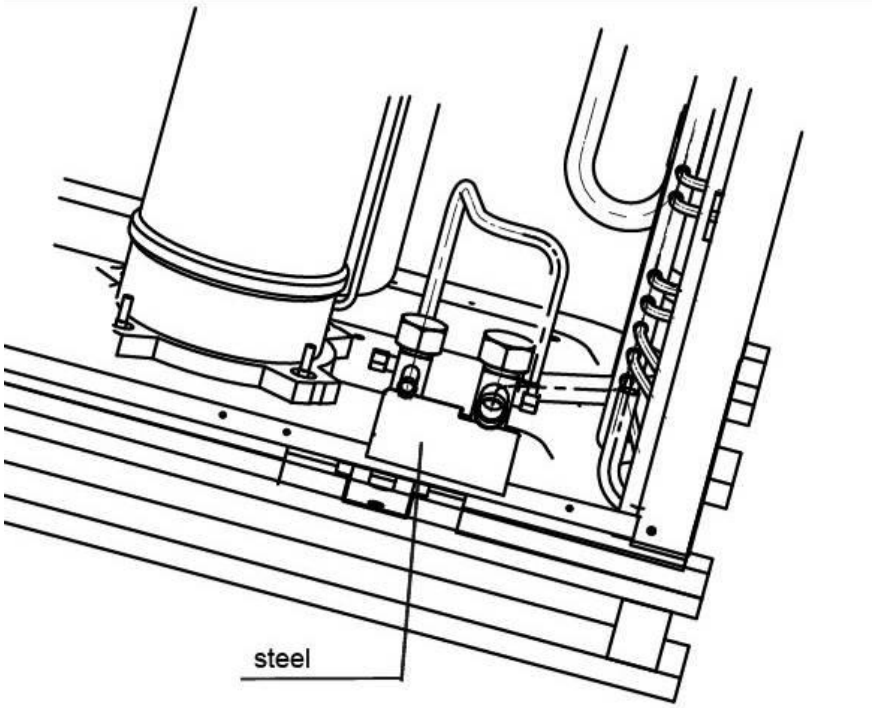


Fig-20

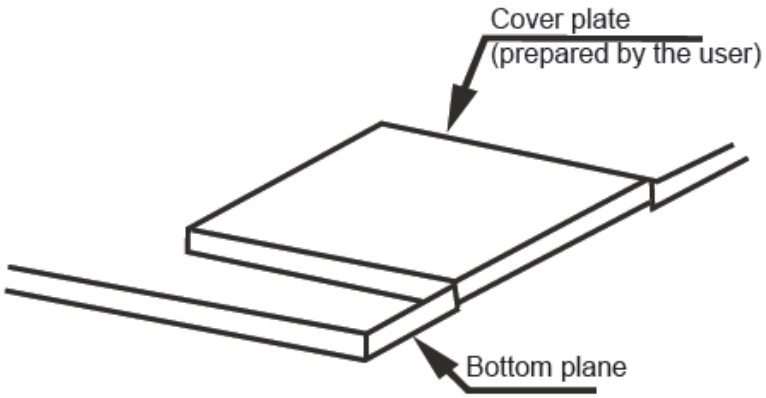


Fig-21

NOTE:
When welding the refrigerant pipe, in order to prevent internal oxidation of the pipe, nitrogen must be filled in. Otherwise, the oxidized chips may block refrigerating circulatory system.

2.5.1 Size of Outdoor Unit Pipes and Piping Methods

1) Size of outdoor unit pipes and piping methods

Model	Gas side	Liquid side
ASE-76AH	Φ22	Φ9.52
ASE-96AH	Φ25	Φ9.52
ASE-120AH	Φ28.6	Φ12.7

2) Allowed length of refrigerant pipe and height difference (Fig-22)

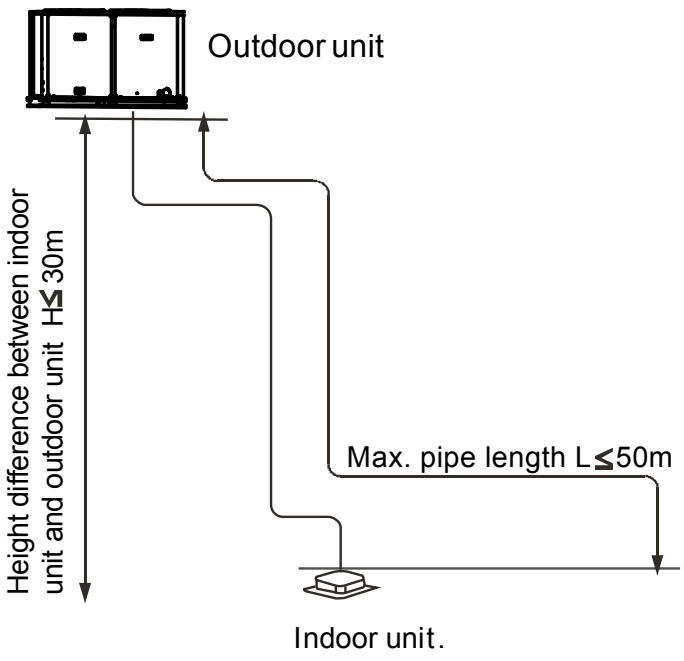
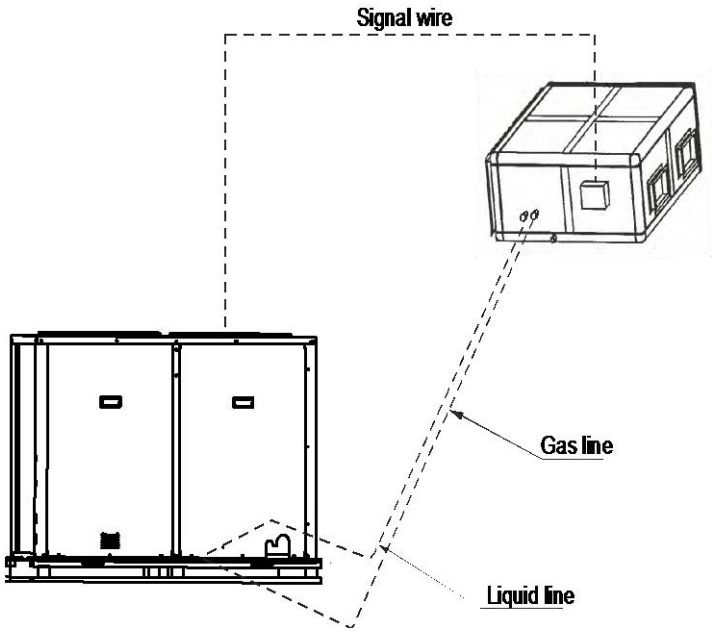


Fig-22

Table 1:

			76000, 96000 Btu/h	120000 Btu/h
Max. equivalent length of pipe (L)			50m	50m
Max. height difference	Height difference between indoor unit and outdoor unit (H)	Outdoor upper	30m	30m
		Outdoor lower	30m	30m

3) Connection between indoor unit and outdoor unit (Fig-2 3)



7 6 0 0 0 , 9 6 0 0 0 , 1 2 0 0 0 0 B t u / h

Fig-23

2.6 Airtight Test

After the pipes between the indoor unit and the outdoor unit are connected, replenish compressed nitrogen to perform airtight test.

NOTE:
1. The airtight test is performed by using the compressed nitrogen [2.94MPa (30kg/cm^{2}G)].
2. Tighten the spool of the gas valve and liquid valve before compressing the nitrogen.
3. Compress the nitrogen at the air vent of the gas valve.
4. The gas valve and liquid valve are closed in the process of compressing the nitrogen.
5. Do not use oxygen, flammable gas or toxic gas in the airtight test.

2.7 Vacuumize

Use a vacuum pump to make a vacuum. Do not use refrigerant gas to expel air.
When making the vacuum, start from the air side.

2.8 Open All Valves

2.9 Additional Charge of Refrigerant

According to the diameter and length of the connective liquid side pipe of the outdoor unit and indoor unit, calculate the refrigerant replenishment quantity. The refrigerant for replenishment is R410A.

Table 2:

Diameter of liquid line	Quantity of refrigerant replenished for 1m pipe length
ϕ 9.52	0.060kg
ϕ 12.7	0.115kg

2.10 Remove Trash and Moist in the Pipe

- Trash and foreign matters may come into the pipe in the process of installing the refrigerant pipe. Be sure to blow them off with nitrogen before connecting the pipe to the outdoor units.
- Use high-pressure nitrogen to clean the pipelines. Do not use the refrigerant of the outdoor unit for cleaning.

2.11 Refrigerant Leak Precautions

This air conditioner uses refrigerant R410A. The R410A is safe refrigerant which is harmless and non-flammable. The room for placing the air conditioner should have a proper space. Even if refrigerant leakage occurs, the density threshold will not be crossed. Additional measures may also be taken.

1) Density threshold: Density of the Freon gas that does not harm the human body. Density threshold of R410A: 0.3 [kg/m3]

- Calculate the total quantity of refrigerant to be replenished (A [kg]). Total refrigerant quantity for 10HP = refrigerant replenishment quantity upon shipment (11[kg]) + additional refrigerant replenishment corresponding to the pipe length
- Calculate out the indoor volume (B [m3]) (according to the minimum volume)
- Calculate out the refrigerant density:

$$\frac{A[kg]}{B[m^3]} \leq \text{Density threshold: } 0.3\ [kg/m^3]$$

2) Measures against crossing of the refrigerant density threshold

- In order to keep the refrigerant density below the threshold value, please install a mechanic ventilation device. (Perform ventilation often)
- In case frequent ventilation is impossible, please install the leakage detection alarm device linked with the mechanical ventilation device.

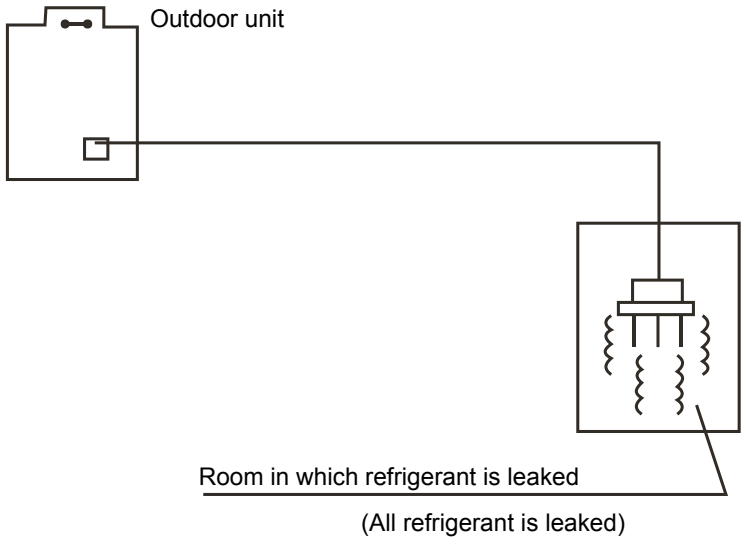


Fig-24

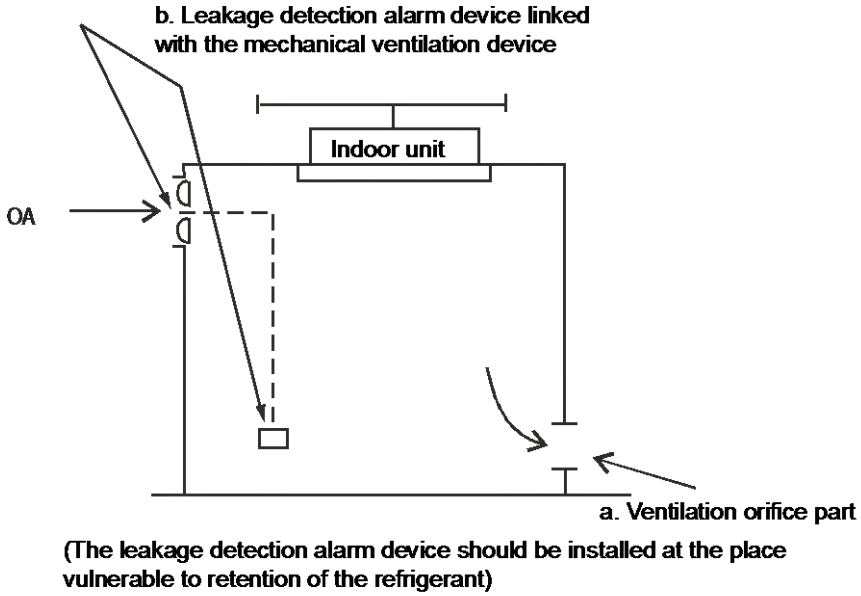

b. Leakage detection alarm device linked with the mechanical ventilation device
Indoor unit
OA
a. Ventilation orifice part
(The leakage detection alarm device should be installed at the place vulnerable to retention of the refrigerant)

Fig-25

2. 12 Completing the Connection System Name

In case multiple systems are set, in order to identify the connection system of the indoor unit and outdoor unit, it is necessary to give name to each system, and mark it onto the nameplate on the electric control box cover of the outdoor unit.

NOTE:

- The indoor unit and outdoor unit are categorized into system A and system B. When installing and connecting the indoor unit and outdoor unit, identify the label carefully, and make sure that indoor unit corresponds to the outdoor unit exactly. Otherwise, it may lead to fault of the air conditioner.
- Model of indoor unit. Room name
  Example: the first system indoor unit A of the 2nd floor is recorded as: 2F 1A.

3. Heat Insulation of the Pipe

3.1 Heat Insulation of the Pipe

In order to prevent faults caused by condensate of the refrigerant pipe and drain pipe, perform condensate prevention and heat insulation properly.

CAUTION:

If it is forecast that high humidity/temperature environment (condensate temperature is over 23℃) may exist in the ceiling, e.g., inside the ceiling with slab, ceiling which is in the same environment as the outdoor air), it is necessary to apply 10mm or thicker adiabatic wool (16~20kg/m2) to the refrigerant pipe and the drain pipe in addition to applying the general heat insulation materials. Enough heat insulation materials should also be applied to the refrigerant joint and the pipe joint.

3.2 Heat Insulation of the Drain Pipe

- Be sure to entwine heat insulation materials round the drain pipe which runs through the room.
- Carry through heat insulation for the drain pipes thoroughly.

3.3 Heat Insulation of the Refrigerant Pipe

- Please use heat-resistant materials as heat insulation materials of the air-side pipe. (e.g., EPT)
- Cover heat insulation materials separately at the liquid side and the air side. Moreover, perform heat insulation thoroughly for the air-side pipes of the indoor unit, and prevent water from dripping outside the unit.

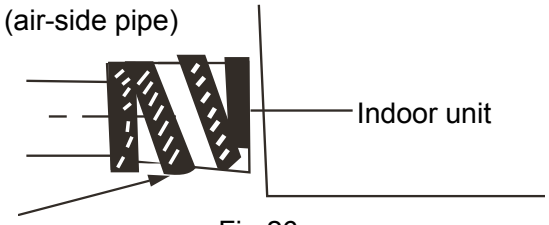


Fig-26

- After applying the auxiliary heat insulation materials, use vinyl resin tape to seal it lest water leak.

4. Installation of Connective Pipe

4.1 Preparation before Installation

Check the height difference between the indoor unit and the outdoor unit, and check the length and number of bends of the refrigerant pipeline, which must meet the following requirements:

- Max. Height difference....30m (If the height difference is greater than 5m, it is better to put the outdoor unit above the indoor unit).
- Max. Pipeline length.....50m
- Max. Number of bends.....15
- In the process of installing the connective pipe, do not lemmas the air, dust or foreign substance intrudes into the pipeline system.
- Install the connective pipe only after fixing the indoor and outdoor units.
- Keep dry when installing the connective pipe. Do not let moist intrude into the pipeline system.

4.2 Procedure of Connecting Pipes

5.2.1 Measure the required length of the connective pipe, and make the connective pipes in the following procedure.

5.2.1.1 Connect the indoor unit first, and then connect the outdoor unit.
The pipe bend should be handled carefully, without damaging the pipe.

NOTE:

1. Before screwing up the flared nut, apply refrigerant oil at the outer surface of the pipeline flare and the taper surface of the connection nut. Screw up the nut for 3~4 circles beforehand.

2. When connecting or disconnecting the pipeline, be sure to use two spanners concurrently.

3. Do not rest the weight of the connective pipe on the adapter of the indoor unit. Too heavy load on the adapter of the indoor unit may deform the pipe and thus affect the cooling/heating effect.

4.2.1.2 The valve of the outdoor unit should be closed completely (as in the factory status). Every time when connecting the pipe, screw off the nut at the valve, and connect the flared pipe (within 5 minutes). If the nut is put away for a long time after being screwed off the valve, dust and other foreign substance may intrude into the pipeline system and lead to fault. Before connecting the pipe, use the refrigerant to expel air out of the pipe.

4.2.1.3 After the refrigerant pipe is connected to the indoor and outdoor units, expel air as instructed in the “Expel air” section. After expelling the air, screw up the nut at the maintenance orifice.

4.2.1.4. Precautions for the flexible part of the pipeline

The bend angle shall not exceed 90°.
The bend shall be preferably in the middle of the pipe length, and higher bend radiuses are preferred. Do not bend the flexible pipe for over 3 times.

4.2.1.5 Bend the thin-wall connective pipe

When bending the pipe, cut out a notch of the desired size at the bend of the adiabatic pipe, and then expose the pipe (wrap the pipe with the wrapping tape after bending it).
The radio of the elbow pipe should be as large as possible to prevent flattening or crush.
Use the pipe bender to make close elbow pipe.

4.2.1.6 Use purchased copper pipe

When the cooper pipe is purchased from the market, be sure to use the heat insulation materials of the same type (with a thickness of over 9mm).

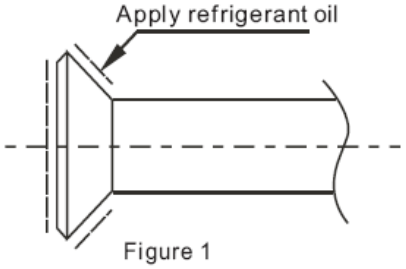


Figure 1

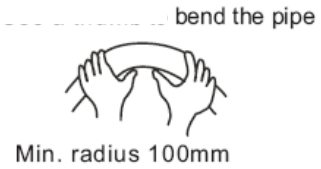


Figure 2

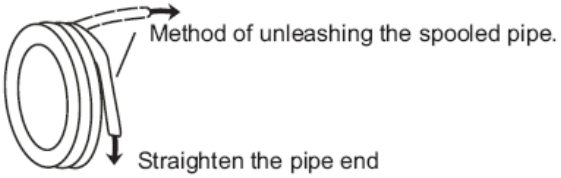


Figure 3 Fig-27

4.2.2 Deploy the pipelines

- Drill a porthole on the wall, and put the hole sheath and hole cover through the wall.
- Place the connective pipe together with the indoor & outdoor connection wires. Use wrapping tape to tie them tight. Do not let air penetrate into it lest condensation and drips of moist.
- Pull the connective wrapped connective pipe from outdoor through the sheath which gets through the wall, and lead it into the room. Lay out the pipelines carefully lest damage to the pipes.

4.2.3. Make a vacuum of connective pipeline.

4.2.4. After the above steps are completed, the spool of the valve of the outdoor unit should be completely open, and the refrigerant pipeline of the indoor unit and the outdoor unit should be smooth.

4.2.5. Use leak detector or soap water detect leak carefully to prevent leakage.

4.2.6. Put on an adiabatic envelope (accessory) at connective pipe adapter of the indoor unit, and wrap it tight with the wrapping tape lest condensate and leakage.

- **Flare**

a. Use a pipe cutter to cut off the pipe.

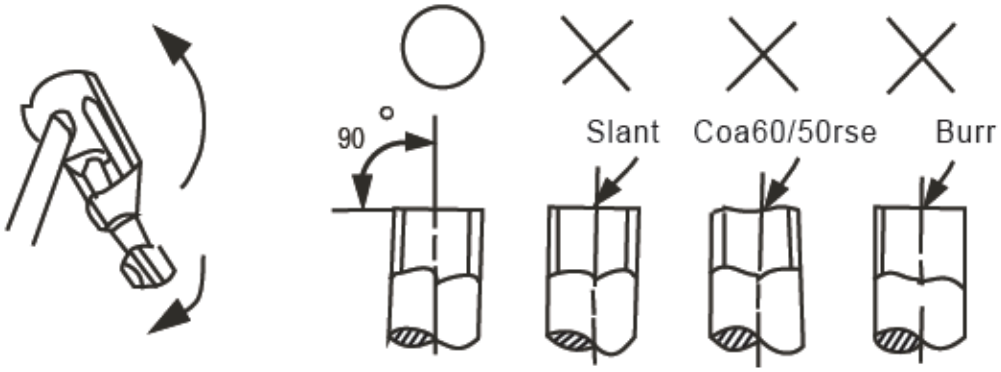


Fig-28

b. Pull the pipe into the rear flare of the connective nut.

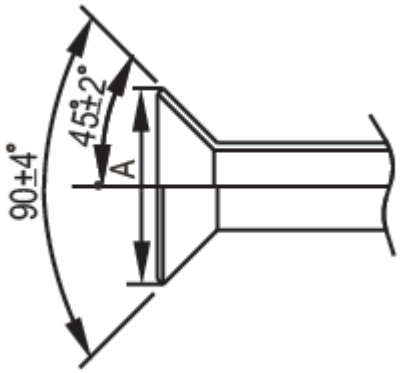


Fig-29

- **Tighten the nut**

Align with the connective pipe
Screw up the connection pipe nut manually, and use a spanner to tighten it as shown in Fig-38

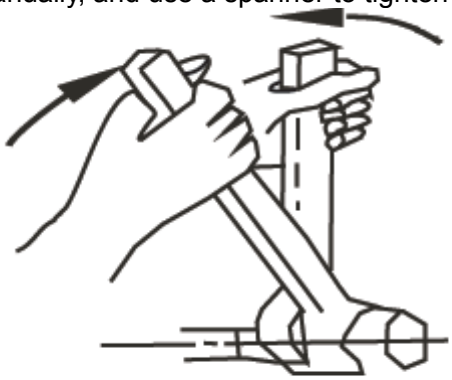


Fig-30

NOTE:
According to the installation conditions, too large torque will damage the flaring, and too small torque will lead to looseness and leakage. Determine the tightening torque by reference to the following table.

- **Replenishment quantity of refrigerant required for air conditioner**

The single-pass pipe is shorter than 5 m, and no additional length is required (note: The unit has been replenished before being shipped).
If the single-pass pipe length is 5 m or more, the quantity of fluorine required to be replenished is 0.060X (L-5). (Unit: kg)
Record the replenishment quantity of the refrigerant and keep the record properly for reference in future maintenance.

Table 3:

Pipe diameter	Torque
φ 6.35	1420~1720N.cm (144~176kgf.cm)
φ 9.53	3270~3990N.cm (333~407kgf.cm)
φ 12.7	4950~6030N.cm (504~616kgf.cm)
φ 16.0	6180~7540N.cm (630~770kgf.cm)
φ 19.0	9720~11860N.cm (990~1210kgf.cm)

4.3 Expelling Air

4.3.1. From the following table, select a method of expelling air.

Table 4:

Length of connective pipe (single pass)	Procedure of expelling air
Less than 5m	Use refrigerant in the outdoor unit
5～15m	Use vacuum pump or refrigerant tank.

If the air conditioner is relocated, be sure to use a vacuum pump or refrigerant tank to expel air.

4.3.1.2. Use the refrigerant in the outdoor unit to expel air (**see Fig-31** and **Fig-32**)

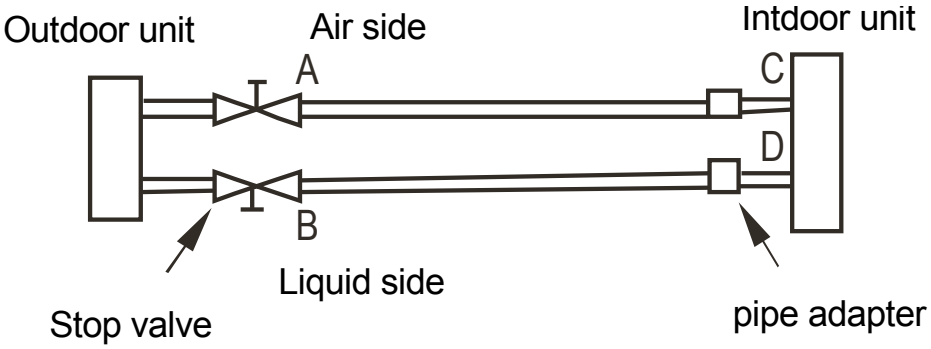


Fig-31

- Screw up the pipe nuts at A, B, C and D completely.
- Loosen and remove the square-head cover of valves A and B, rotate the square-head spool of valve B counterclockwise for 45 degrees and stay for about 10 seconds, and then close the spool of valve B tightly.
- Detect leak for all adapters at A, B, C and D. After making sure that no leak exists, open the maintenance orifice nut of valve A. After all air is expelled, tighten the maintenance orifice nut of valve A.
- Open the spools of valves A and B completely.
- Tighten the square-head cover of valves A and B completely.

4.3.1.3. Use refrigerant tank to expel air (see **Fig.6-8** and **Fig.6-9**)

- Screw up the pipe nuts at A, B, C and D completely.
- Loosen and remove the square-head cover and the maintenance orifice nut of valves A and B.
- Connect the filler hose of the refrigerant tank with the maintenance orifice of valve A.
- Loosen the valve of the refrigerant tank, continue filling refrigerant for 6 seconds to expel the air, and tighten the nut of valve B quickly.
- Loosen the valve of the refrigerant tank again, and fill the refrigerant for 6 seconds. Detect leak for all adapters at A, B, C and D. After making sure that no leak exists, screw off the filler hose. After all the filled refrigerant is expelled, screw up the maintenance orifice nut of valve A quickly.
- Open the square-head spools of valves A and B completely.
- Tighten the square-head cover of valves A and B.

4.3.1.4. Use a vacuum pump to expel the air (**Fig-32**) (For method of using the manifold valve, see the operation manual of manifold valve):

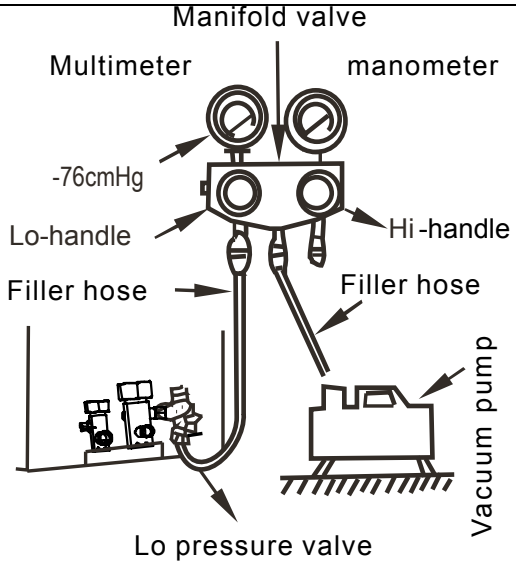


Fig-32

- Loosen and remove the maintenance orifice nut of valve A, and connect the filler hose of the manifold valve to the maintenance orifice of valve A (tighten both valve A and valve B).
- Connect the filler hose adapter to the vacuum pump.
- Open the low pressure (Lo) handle of the manifold valve completely.
- Start the vacuum pump to extract air. At the beginning of extracting air, slightly loosen the maintenance orifice nut of valve
- B, check whether any air enters it (the vacuum pump noise changes and the multi-meter indicate from negative to 0). Then tighten this maintenance orifice nut.
- Upon completion of vacuuming, tighten the low pressure (Lo) handle of the manifold valve completely and stop the vacuum pump. Keep extracting air for over 15 minutes. Check whether the multi-meter points at -1.0X10 Pa (-76cmHg).
- Loosen and remove the square-head cover of valves A and B. After opening valves A and B completely, tighten the square head cover of valves A and B.
- Remove the filler hose off the maintenance orifice of valve A, and then tighten the nut.

4.3.1.5. Procedure of using stop valve

- Open the spool until it touches the stop block. Do not attempt to open further.
- Use a spanner or a similar tool to tighten the bonnet. The bonnet tightening torque is shown in Table 3 “Tightening torque”.
- Upon completion of installation, open all valves before trial run. Each unit has two valves of different sizes located at the outdoor unit side. Of the two valves, one is gas valve and the other is liquid valve. The procedure of opening/closing the valve is shown in the right figure (Fig-33).
- Procedure of opening the valve: Open the square-head cover, use a spanner to capture the square head and open it thoroughly. Then tighten the square-head cover.
- Procedure of closing the valve: Same as the procedure of opening the valve, but rotate the spanner clockwise thoroughly.

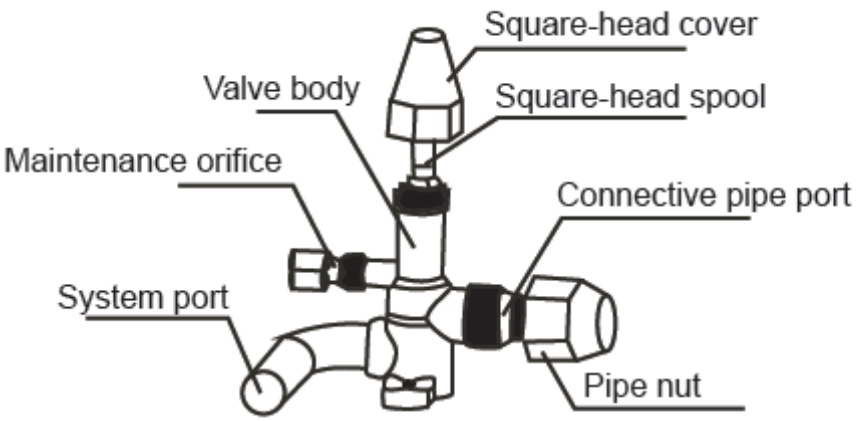


Fig-33

4.4 Leak Detection

Use soap water or a leak detector to check whether gas leakage exists at the adapters.

4.5 Heat Insulation

- Use heat insulation materials to wrap the part protruding outside the flared pipe joint and the refrigerant pipe of the liquid pipe and the gas pipe, and ensure that no gap exists between them.
- Imperfect heat insulation may lead to condensate drips.

5. Installation of Drain Pipe

5.1 Install the drain pipe of the indoor unit

- In order to prevent drain overflow, install a drainage controller at place 1 of the drain pipe. (The drainage controller is designed to smoothen the drainage when the static pressure outside the unit is high, especially at the air inlet, in addition to remove stink through the drain pipe.)
- The drain of water is natural. In the construction, the external pipe of the outdoor unit slants downward at a gradient of 1/50~1/100.
- The number of bends and folds of the drain pipe should not exceed 2. Try to avoid bends in order to prevent trash accumulation.
- In the construction, do not drop trash into the drip tray or drain pipe of the indoor unit.
- Upon completion of installing the drain pipe, remove the inspection panel. Put water into the drip tray to check whether the water can be drained levelly and steadily.

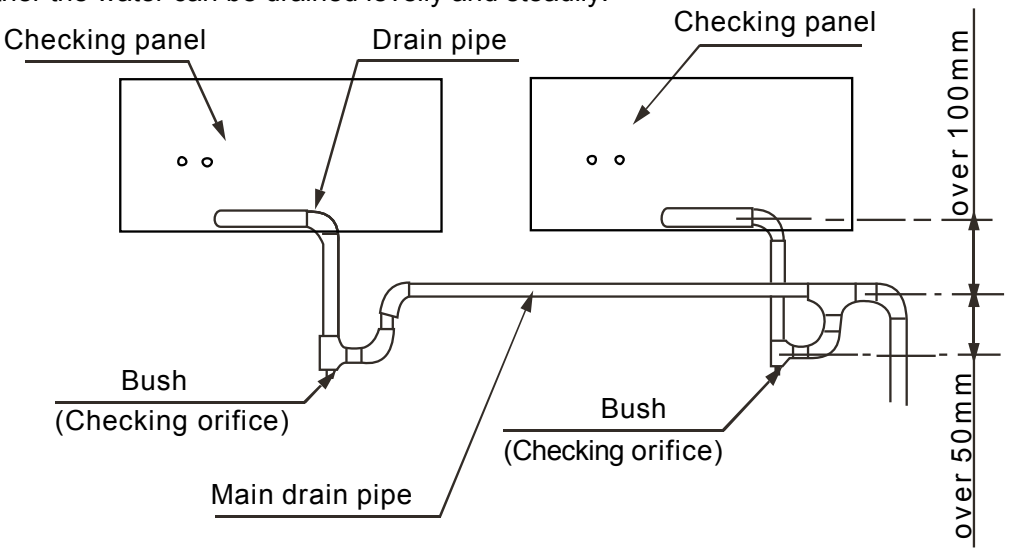


Fig-34

NOTE:
Drain pipe trash gains easily at the drainage controller. Be sure to install a stopper and a structure that cleans up trash easily.

5.2. Trial draining of the drain pipe

Open the side panels of the indoor unit, fill water inward, and check whether the water can be drained smoothly. Check water leak at the joint.

5.3. Heat insulation of drain pipe

After making sure that the water drains smoothly and no water is leaked, use adiabatic wool bushes to preserve heat of the drain pipe. Otherwise, condensate will occur.

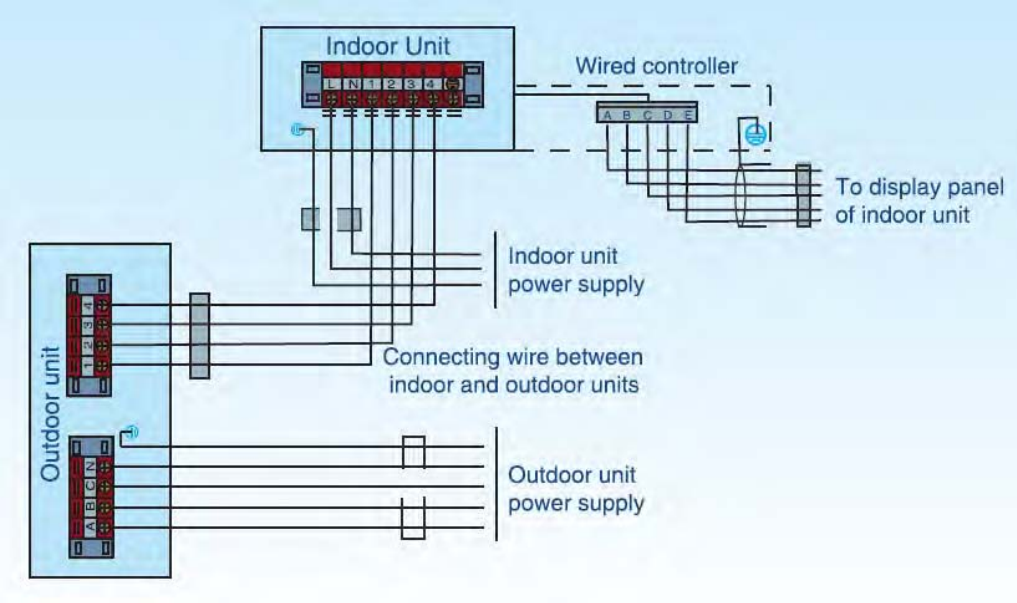
6. Electric Connection

6.1 Electric field wiring

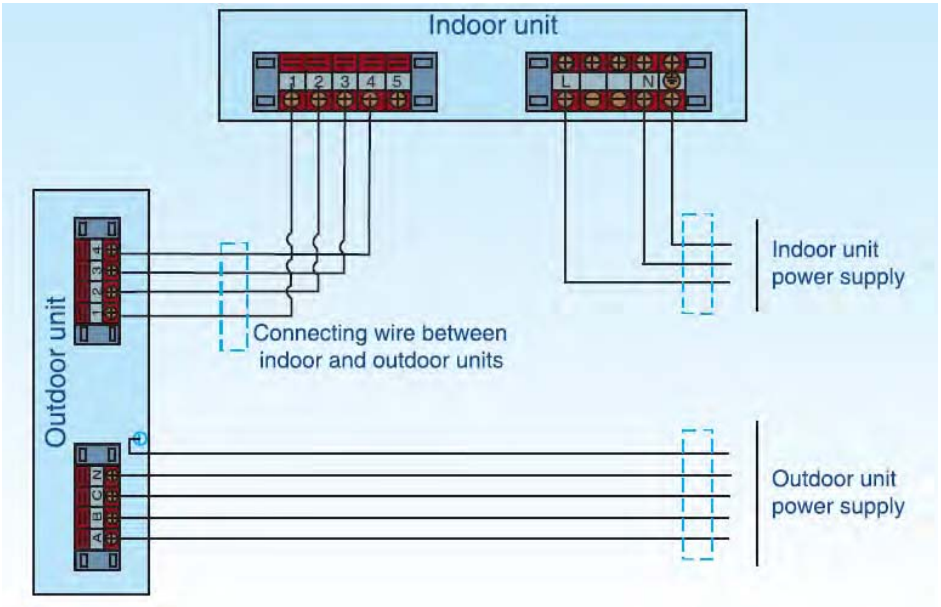
CAUTION:

- Use special power supply for the air conditioner. Design power supplies specific to the indoor unit and outdoor unit. The supply voltage must comply with the nominal voltage.
- The external supply circuit of the air conditioner must have a ground wire, and the power supply ground wire of the indoor unit must be connected with the external ground wire firmly.
- The wiring must be performed by professional technicians according to the circuit diagram labels.
- Distribute the wires according to the relevant electric technical standards promulgated by the State, and set the Residual Current-operated Circuit Breaker (RCCB) properly.
- The power wire and the signal wire shall be laid out neatly and properly, without mutual interference or contacting the connection pipe or valve.
- No power cable is attached to this equipment. The user can select the power cable by reference to the stipulated power supply specifications. No joint of wires is allowed.
- Upon completion of wire connection, double check it and then connect the power supply.

6.1.1 Duct type - 76 kBtu/h; 96 kBtu/h; 120 kBtu/h:



6.1.2 **Floor standing type - 76 kBtu/h; 96 kBtu/h:**



Outdoor unit:

Model	ASE-76AH	ASE-96AH	ASE-120AH
Power supply	380~415V-3N-50Hz	380~415V-3N-50Hz	380~415V-3N-50Hz
Capacity of power supply/ fuse (A)	60/40	60/40	60/40
Power supply cable	YCW-450/750 4*6.0 mm^2	YCW-450/750 4*6.0 mm^2	YCW-450/750 4*6.0 mm^2
Grounded wire	YCW-450/750 6.0 mm^2	YCW-450/750 6.0 mm^2	YCW-450/750 6.0 mm^2
Connective wire of indoor to outdoor unit	RVV-300/500 4*1.0 mm^2	RVV-300/500 4*1.0 mm^2	RVV-300/500 4*1.0 mm^2
Wire controls connective wire	RVVP-300/300 5*0.5mm²	RVVP-300/300 5*0.5mm²	RVVP-300/300 5*0.5mm²

6.3 Power wires

The power wires are as follows: (schematic diagram)

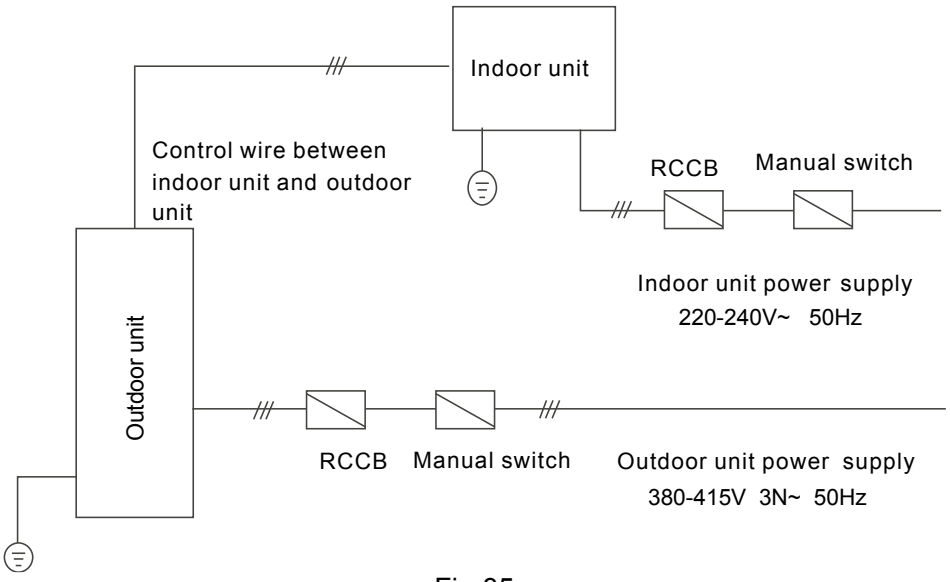
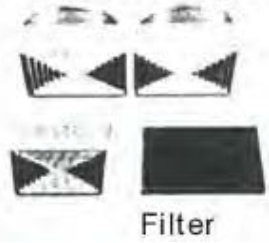
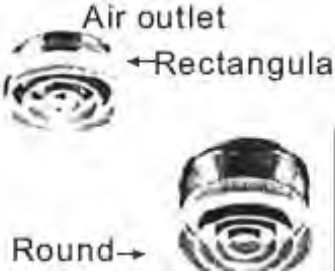
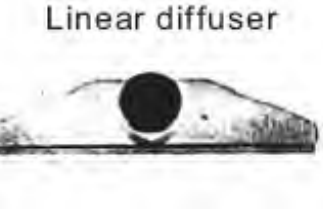


Fig-35

7. Methods of configuring and selecting installation

	Material name	Characteristics, advantages and other contents
1	Air inlet wooden grille  Filter	**1.** Install the filter at the main body grille in case the storey height is low, and at the main body of the indoor unit in case the storey height is high. **2.** It cleans conveniently at the time of installing/uninstalling the filter. **3.** The button structure is easy to install and uninstall.
2	Hose (for absorbing noise) 	**1.** For purpose of air inlet. **2.** Must adopt fire-resistant materials. (Those materials other than specified by Midea than specified by Midea be applied) **3.** The heat insulation material must be glass wool.
3	Hose (for general purpose) 	**1.** For purpose of air outlet. **2.** Must adopt fire-resistant materials. (Those materials other materials. (Those materials other shall not be applied) **3.** The heat insulation material must be glass wool.
4	Air inlet noise pipe 	**1.** Install the unit at the air inlet so that the air flows smoothly and the noise is lower. **2.** The noise value varies with the length. **3.** The hose joint should be bent lest detachment of the pipe.
5	Air outlet noisepipe 	**1.** Install the unit at the air outlet so that the air flows smoothly and the noise is lower. **2.** The noise value varies with the length. **3.** The hose joint should be bent lest detachment of the pipe.
6	Distributor 	**1.** Install the unit at the air outlet so that the air flows smoothly and the noise is lower. **2.** Select 1BY2 or 1BY3 according to the quantity of the diffusers. **3.** The diffuser pipes should preferably have the same length after branching, and the minimum length of the ventilation pipes is 5m.

7		**1.** Fixed model that diffuses air at a 360 angle. **2.** The outline size should increase when the air volume is over 350CMH. (For above 303), i.e., when about 9 diffusers are required, the outline size should increase. **3.** The diffuser pipes should preferably have the same length after branching, and the minimum length of the ventilation pipes is 5m.
8		**1.** Fixed model that diffuses air at a 360 angle. **2.** The outline size should increase when the air volume is over 350CMH. (For above 303), i.e., when about 9 diffusers are required, the outline size should increase. **3.** Proper air speed: For air speed of over 2-3.5m/s, select other diffusers (with great noise). **4.** Install the diffuser pipe if it is necessary to install the model of over 3.5m/s. **5.** For purpose of cooling-only model.
9		**1** The lengthwise adjustable model which diffuses air at a 360 angle. **2.** With the change of the cooling/heating air flow, the horizontal and vertical distance of the fan can be adjusted (applicable to department store and exhibition hall where the decorative effect is essential).
10		**1.** Low noise compared with other air outlets. Applicable to tall buildings that require along distance of air conditioning. **2.** Select the ventilation pipe connection caliber according to the distance and the air speed. **3.** Applicable to storey height of over 5m (for design of tall storey such as temple, consult Midea).
11		**1.** The fan is the adjustable type which can change direction of air flow. It is used for deluxe decoration. **2.** The outline size should increase when the air flow is over 450CMH (3 or 4 SOLT) when about 6 diffusers are required, the outline size should increase. **3.** If the proper air speed is 2.5-5m/s and actual air speed reaches over 5m/s, it is necessary to choose other diffusers (with higher noise values).

12	Air outlet woodengrille 	**1.** Low noise compared with other air outlets. Applicable to tall buildings that require a long distance of air conditioning. **2.** Select the ventilation pipe connection caliber according to the distance and the air speed. **3.** Applicable to storey height of over 5m (for design of tall stores such as temple, consult Midea).
Auxiliary materials	Duct wrapping tape 	**1.** Flanges and pipelines connected to the ventilation pipes. **2.** When the noise pipe is connected with the hose, the ventilation pipe tape must be applied (otherwise, with only adhesive tape, the adhesion will be weakened due to change of temperature).
	Aluminium adhesive tape 	**1.** It is used to prevent glass wool leak and seal the gas at the time of the flanges and pipelines of the ventilation pipes. **2.** Entwine for over 3 circles. **3.** Use ventilation pipe-specific tapes (instead of ordinary adhesive tapes). In order to ensure the installation quality and durability, it is necessary to use the auxiliary materials of standard specifications provided by Midea Electronics and the auxiliary products of the specified manufactures.

Part 4 Control

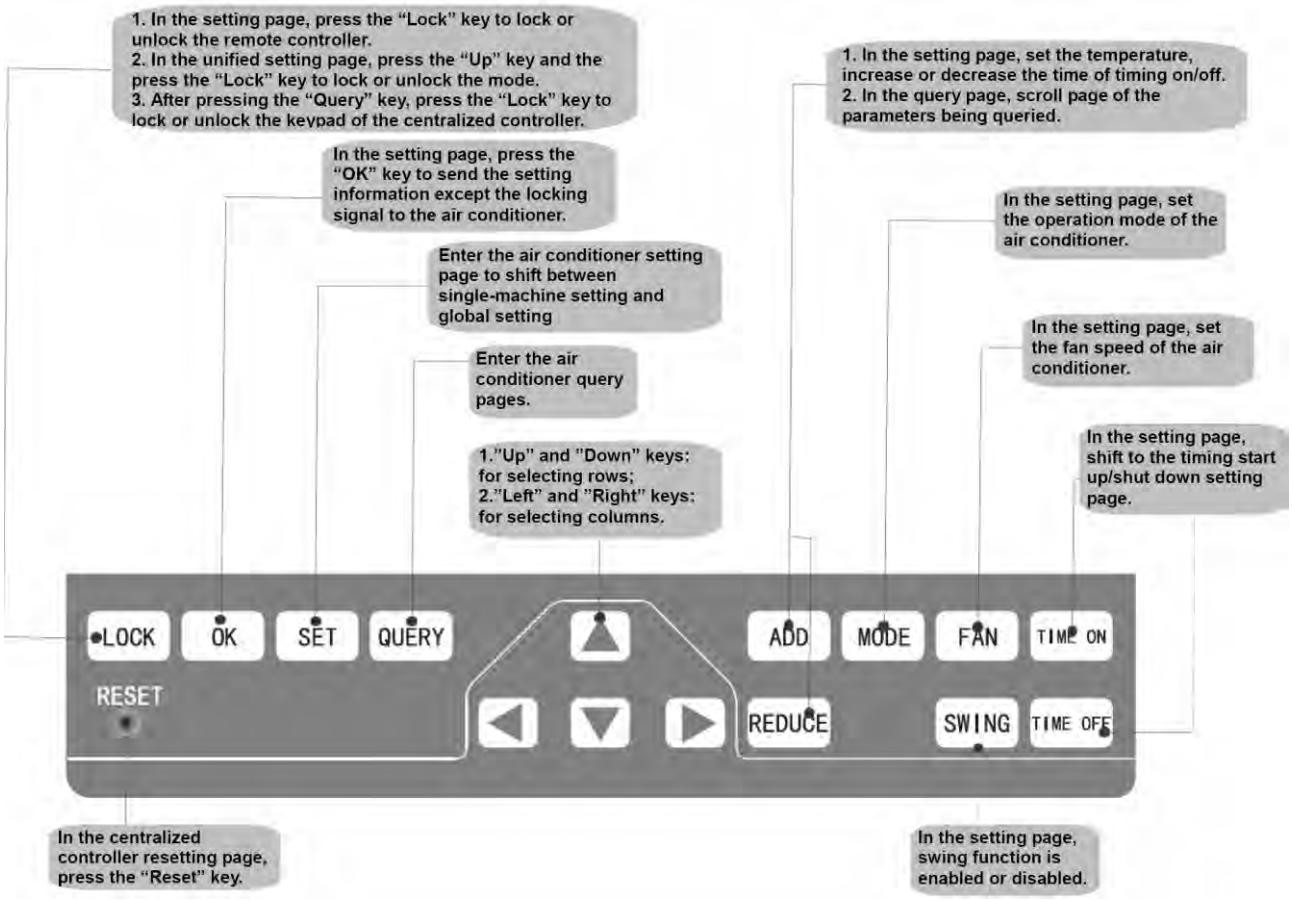
1. Central Control Monitor (Optional) 50

1. Central Control Monitor (Optional)

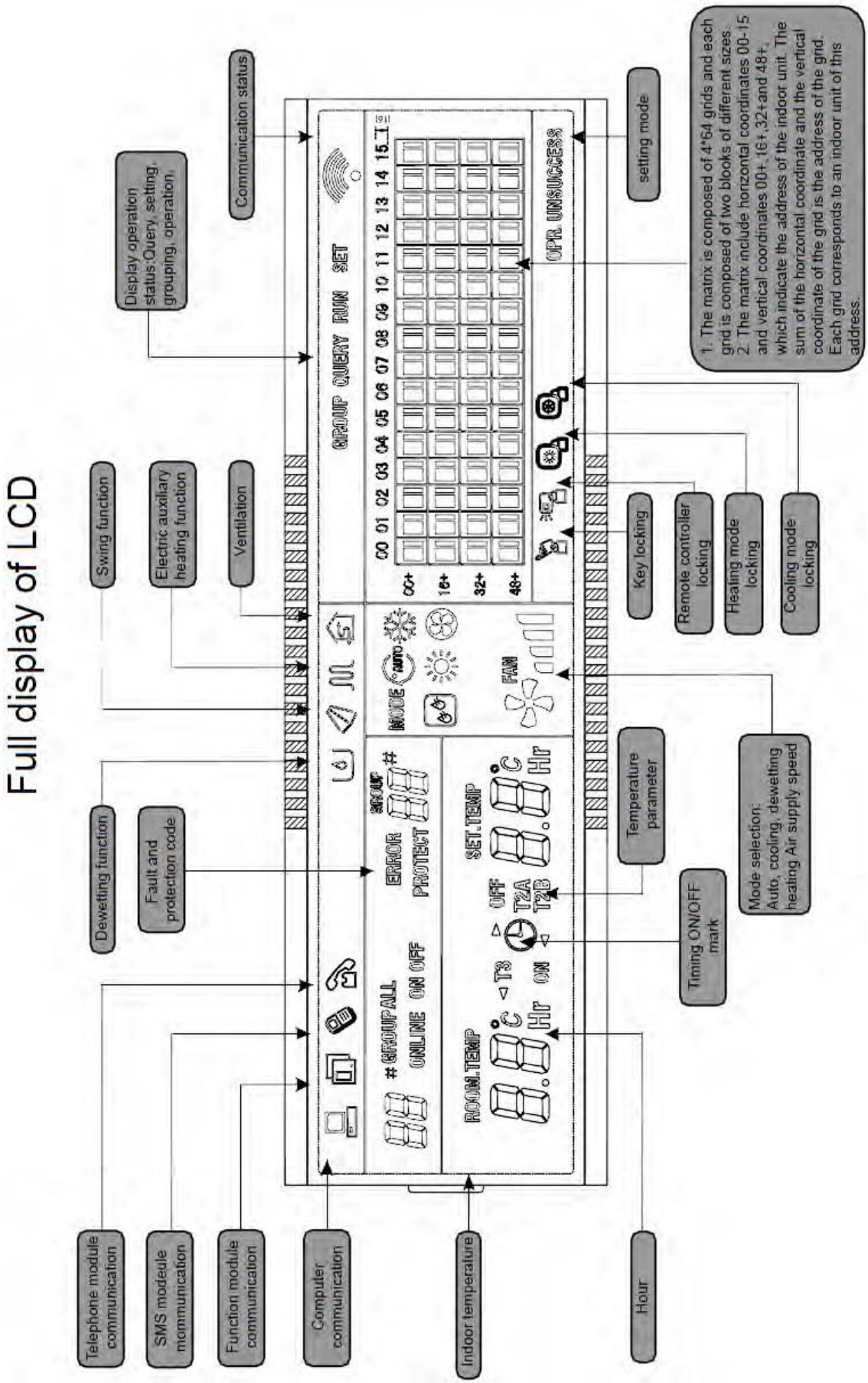
CCM03

1) Overview

Buttons and Functions


1. In the setting page, press the "Lock" key to lock or unlock the remote controller.
2. In the unified setting page, press the "Up" key and the press the "Lock" key to lock or unlock the mode.
3. After pressing the "Query" key, press the "Lock" key to lock or unlock the keypad of the centralized controller.
In the setting page, press the "OK" key to send the setting information except the locking signal to the air conditioner.
Enter the air conditioner setting page to shift between single-machine setting and global setting
Enter the air conditioner query pages.
1."Up" and "Down" keys: for selecting rows;
2."Left" and "Right" keys: for selecting columns.
1. In the setting page, set the temperature, increase or decrease the time of timing on/off.
2. In the query page, scroll page of the parameters being queried.
In the setting page, set the operation mode of the air conditioner.
In the setting page, set the fan speed of the air conditioner.
In the setting page, shift to the timing start up/shut down setting page.
LOCK
OK
SET
QUERY
RESET
ADD
MODE
FAN
TIME ON
REDUCE
SWING
TIME OFF
In the centralized controller resetting page, press the "Reset" key.
In the setting page, swing function is enabled or disabled.

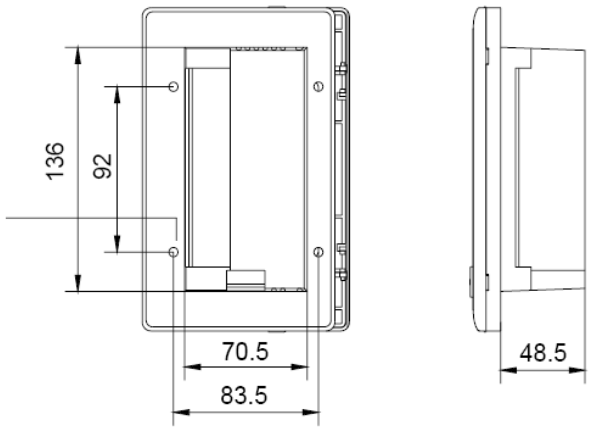
Liquid Crystal Display:

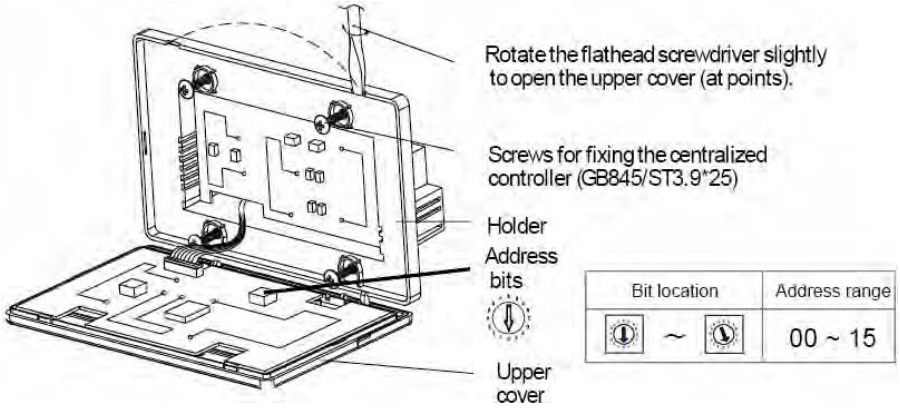


2) Installation

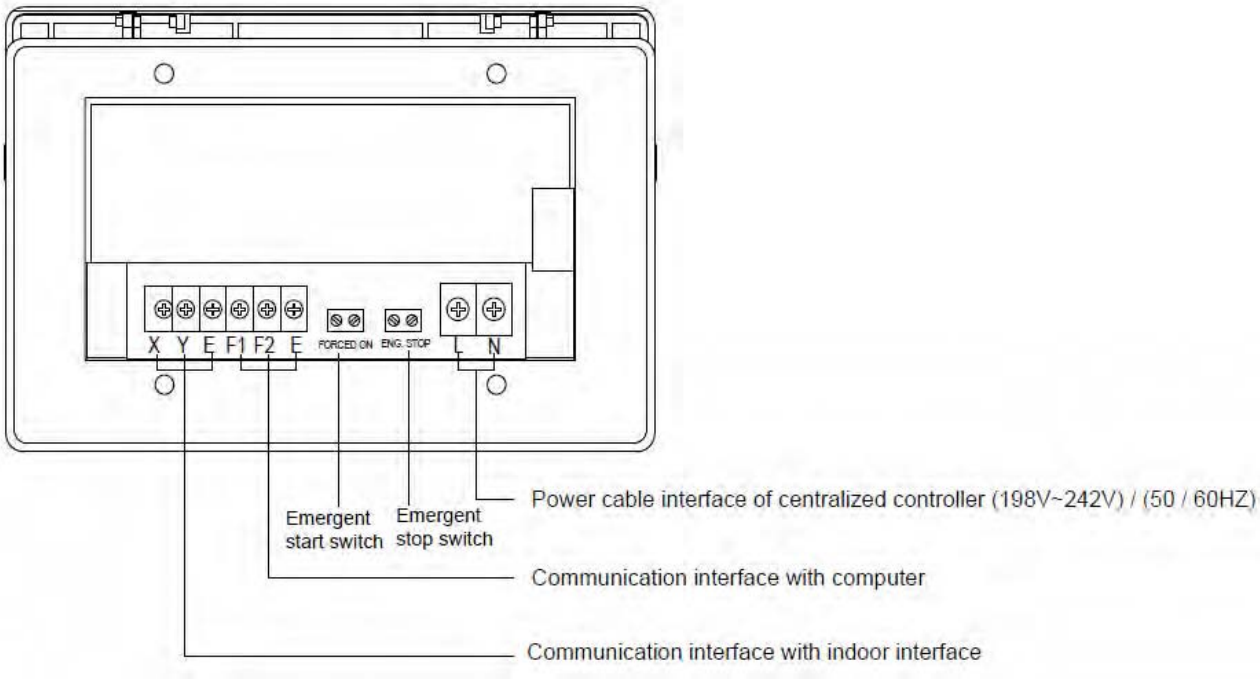
Installation dimensions:
As shown in the figure on the right side.

Installation screw holes (4 holes)





Note: To differentiate each centralized controller, the controllers in the same RS-485 net should be with different address with each other.


X Y E F1 F2 E
FORCED ON
ENG. STOP
L N
Emergent start switch
Emergent stop switch
Power cable interface of centralized controller (198V~242V) / (50 / 60HZ)
Communication interface with computer
Communication interface with indoor interface

NOTE:
1. Never turn screws too tightly, otherwise the cover would be dented, or the Liquid Crystal would be broken.
2. Do not cut wires when installing the cover of Central Control Monitor.

Appendix 1: Indoor Temp. and Pipe Temp. Sensor Resistance Value Table (℃--K)

℃	K Ohm	℃	K Ohm	℃	K Ohm	℃	K Ohm
-20	115.266	20	12.6431	60	2.35774	100	0.62973
-19	108.146	21	12.0561	61	2.27249	101	0.61148
-18	101.517	22	11.5000	62	2.19073	102	0.59386
-17	96.3423	23	10.9731	63	2.11241	103	0.57683
-16	89.5865	24	10.4736	64	2.03732	104	0.56038
-15	84.2190	25	10.000	65	1.96532	105	0.54448
-14	79.3110	26	9.55074	66	1.89627	106	0.52912
-13	74.5360	27	9.12445	67	1.83003	107	0.51426
-12	70.1698	28	8.71983	68	1.76647	108	0.49989
-11	66.0898	29	8.33566	69	1.70547	109	0.48600
-10	62.2756	30	7.97078	70	1.64691	110	0.47256
-9	58.7079	31	7.62411	71	1.59068	111	0.45957
-8	56.3694	32	7.29464	72	1.53668	112	0.44699
-7	52.2438	33	6.98142	73	1.48481	113	0.43482
-6	49.3161	34	6.68355	74	1.43498	114	0.42304
-5	46.5725	35	6.40021	75	1.38703	115	0.41164
-4	44.0000	36	6.13059	76	1.34105	116	0.40060
-3	41.5878	37	5.87359	77	1.29078	117	0.38991
-2	39.8239	38	5.62961	78	1.25423	118	0.37956
-1	37.1988	39	5.39689	79	1.21330	119	0.36954
0	35.2024	40	5.17519	80	1.17393	120	0.35982
1	33.3269	41	4.96392	81	1.13604	121	0.35042
2	31.5635	42	4.76253	82	1.09958	122	0.3413
3	29.9058	43	4.57050	83	1.06448	123	0.33246
4	28.3459	44	4.38736	84	1.03069	124	0.32390
5	26.8778	45	4.21263	85	0.99815	125	0.31559
6	25.4954	46	4.04589	86	0.96681	126	0.30754
7	24.1932	47	3.88673	87	0.93662	127	0.29974
8	22.5662	48	3.73476	88	0.90753	128	0.29216
9	21.8094	49	3.58962	89	0.87950	129	0.28482
10	20.7184	50	3.45097	90	0.85248	130	0.27770
11	19.6891	51	3.31847	91	0.82643	131	0.27078
12	18.7177	52	3.19183	92	0.80132	132	0.26408
13	17.8005	53	3.07075	93	0.77709	133	0.25757
14	16.9341	54	2.95896	94	0.75373	134	0.25125
15	16.1156	55	2.84421	95	0.73119	135	0.24512
16	15.3418	56	2.73823	96	0.70944	136	0.23916
17	14.6181	57	2.63682	97	0.68844	137	0.23338
18	13.9180	58	2.53973	98	0.66818	138	0.22776
19	13.2631	59	2.44677	99	0.64862	139	0.22231

Take-back of electrical waste
Information for Users to Disposal of electrical and electronic equipment (private households)

Icon on the product or in the accompanying documentation means that used electric or electronic products must not be disposed together with domestic waste. For the correct disposal of the product hand it over to a place for take-back, where it is collected free of charge. By correct disposal of the product you can help to preserve valuable natural resources and help in preventing potential negative impacts to environment and human health, which could be consequence of incorrect disposal of waste. Ask for more details from local authorities, nearest collection point, in Waste Acts of respective country, in the Czech Republic in Act no. 185/2001 Coll., in the wording of later regulations. In case of incorrect disposal of this waste, a fine can be imposed according to national regulations.

Manufacturer:

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